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Expository Reading In Schools:
the Nature of the Reader's
Difficulties

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ABSTRACT

The research reported in this thesis arose from the researcher's experiences as a Learning Support teacher in Scottish secondary schools. There was evident staff frustration at the apparent inability of pupils to read expository prose in an effective way.

The research was designed to explore this apparent inability, in the hope that the insights so gained might indicate how best to help pupils in such difficulty. A theoretical model of reading and comprehension was established, and this was used to identify ten sources of potential difficulty - ten features of expository text which seemed likely to impede comprehension.

There were two experimental stages. The ten sources of difficulty provided the framework for Stage 1, a sequence of ten experimental studies. In each, sets of matched texts were generated, with the targeted text feature either prominent or not prominent. These were designated 'high difficulty' and 'low difficulty' texts. Pupils read one of each, and were assessed on their comprehension immediately after reading. There was no access to the text during assessment, as the concern was with comprehension and retention during normal reading, rather than ability to refer back to text effectively after reading. The experimental populations were 11 - 12 year olds, the experimental population in each study typically being around 50 pupils.

Stage 2 used a single test of similar design. It targeted those text features from Stage 1 that had discriminated most effectively between successful and unsuccessful readers. In addition, it explored reader responses to the targeted text features in texts at two levels of difficulty: simple text and normal text. The experimental population was the entire S1 intake of a large city comprehensive (N=160).

The results overall indicated that less successful readers made use of the text features in a manner broadly similar to that of successful readers. Their failure, then, could not be attributed to an inability to make use of these higher level processing skills. They did use them. The cause of failure lay elsewhere - presumably at lower levels of processing.

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Chapter 1: INTRODUCTION

1.1 Identifying the problem

Teachers often express frustration at the persisting difficulties experienced by many pupils in gaining information from expository text. They refer not to the small number of children who find the basic processes of oral reading difficult. Their frustration seems to centre more upon that far larger group of children who apparently 'can read', but who seem to get so little from doing so. They 'read', yet appear not to learn from reading. Glaserfeld, writing in 1987, puts his finger neatly on a possible root cause of teachers' frustration - their own linguistic naivety: "The underlying processes of linguistic communication,..., the process on which teaching relies, is usually simply taken for granted. There has been a naive confidence in language and its efficacy." (p.4)

The processes of learning from expository text cannot be considered in isolation from the processes of learning. Glaserfeld is writing about the teaching of mathematical ideas, and refers mainly to spoken discourse: teachers seem often to assume that if they 'tell' something to a pupil, then, all other things being equal, the pupil will 'know' it. The studies in this project are concerned, not with spoken language, but with expository text, where the same problem appears to exist: text fails to inform. All too often, a teacher seems bewildered when a 'concrete' chunk of knowledge has been presented in a text, apparently simply and clearly ... but somehow the pupil does not come to 'know' it.

The studies reported in this thesis were stimulated by this bewilderment. It became a recurring strand in discussions between the researcher and his teacher colleagues - that is, between a Learning Support teacher in the Scottish secondary sector, and those subject teachers with whom he discussed ways in which the curriculum might be made more accessible to pupils of widely varying skills and abilities. Expository reading is here defined as the reading by pupils of factual prose intended by the author to convey simple facts and concepts to those pupils. Does it cause undue difficulty? If so, why?

On the face of it, there seemed good reason to suppose it did cause difficulty: even with classroom expository passages that seemed relatively simple, with computed difficulty levels apparently within the supposed competence of most of the readers concerned, the comprehension and recall of many pupils tended to be unexpectedly patchy and flawed. Often, as the perplexed teacher might point out, it would be a passage that most pupils could read aloud to the class with fluency and expression and apparent understanding. Why, then, when set to read it silently, in class or at home, did the pupils appear to gain so little from it?

Their 'reading ability' was not in doubt: they read it aloud to the class with skill. Their memory for detail, and their ability to build upon that detail, were not in doubt: it seems likely that the same pupils could recount numerous past episodes of such T.V. soap operas as 'Neighbours', and make thoughtful predictions about events to come. The fact that it was read, rather than heard or watched on television, seemed not to be significant: many of these children could recount with enthusiasm stories they had read long since.

Certainly, the prose that causes the problems, is sometimes dull; sometimes too it forms part of a course of lessons that many of the pupils clearly find to be dull. But that did not seem a sufficient explanation - one felt that there might be other factors involved. These studies set out to explore some aspects of the problem of expository reading in schools: does it cause difficulty; for whom; and why?

1.2 Teachers' views of language, learning and knowledge.

Glaserfeld is not doubting the central role of language in the processes of learning; he is commenting upon our naive interpretation of that role. Language, in one form or another, is overwhelmingly dominant as the medium of formal education. There is evidence that secondary school pupils are exposed to much teacher talk (Dolan, Harrison and Gardner 1979, Barnes, Britton and Rosen 1971); but print must come a close second, and there can be few moments in a pupil's day when print does not play some role. Many subject teachers might define their job in terms of 'transferring' knowledge, and would acknowledge the central role of text in effecting and assisting with this transfer. But such a 'transfer' seems doomed on several accounts. As Glaserfeld pointed out (1987), teachers seem often to assume that if they 'tell' something to a pupil, then, all other things being equal, the pupil will 'know' it. Implied is a model of knowledge as a transferable package, with language as the vehicle of transfer. As will be seen, such a model fails on several counts. Most importantly, knowledge acquisition must be seen as a process of construction, not passive acceptance. Then, continuing the construction metaphor, the new construction must have adequate foundations: new learning, to be effective, must link to and build upon

existing understandings (Ausubel 1968, Ausubel and Robinson 1969). The site must have been surveyed, then prepared. But teachers, in seeking to develop such new learning, often seem hopelessly unaware of the disparities between their own experienced and mature knowledge bases, and the more sparse ones of their pupils. The site is often exceedingly ill prepared. Nicholson (1984), looking at the 'knowledge' of pupils and the 'knowledge' of experts at high school level in Maths, English, Science and Social Studies, found a grave mismatch - this despite apparently purposeful learning. He found pupils' minds to be what he called a maze of confusion.

The problem, then, seems to stem from some wrong assumptions about language and learning. They have been assumptions both evidently false and remarkably robust: nearly fifteen years after publication of 'A Language for Life' (D.E.S. 1975), there seems little effective response from most schools to this major report. Such measures as have been taken have tended to be cosmetic or superficial, leaving undisturbed the central issue: that of the role of active language in the processes of learning, and every teacher being a 'teacher of English.'. The lack of progress has been an example of the difficulties of bringing about real change: probably all schools had a 'Language Across the Curriculum' policy, and gave it real prominence ... but all that remains sometimes appears to be such trivia as correction codes that are common to all departments, or, more positively but still wide of the mark, an increased concern with such matters as the arithmetically computed reading level of worksheets.

1.3 Current treatment of expository reading in the classroom

Much of the foregoing is speculative and subjective; there is relatively little evidence on actual classroom practice, apart from the Schools Council Nottinghamshire surveys in U.K. (Lunzer and Gardner 1979), and some 'patchy surveys' in the U.S. (Barr 1982). It is easy to make subjective generalisations, but difficult to present evidence. There have been no recent large scale surveys of actual reading practice across the secondary curriculum, as there has been for writing (Spencer 1983). But it is probably safe to say that the teaching of silent reading in secondary schools is neglected. In secondary schools in U.K., 'reading' tends to receive specific attention only in 'remedial' settings; English classrooms perhaps emphasise literature and narrative reading, while teachers of other subjects assume that their pupils 'can read', even if only apparently simple texts. There seems to have existed an assumption (accepted by teachers although questioned by researchers - Pugh 1978): that those skills needed to learn from text will develop unaided from oral, narrative reading, and that they will transfer readily to any reading task.

Teachers know that the pupils' native language must be the medium through which all learning occurs. Many of them also seem aware that their own subject area uses language in a distinctive way: few Maths or Science teachers would raise their eyebrows at such concepts as 'mathematical language', or 'scientific style'. Yet they persist in assuming minimum language competences, on the part of their pupils, for which there is no evidence. Indeed, staffroom anecdote makes obvious that they ignore consistently evidence to the contrary, and persistently demand of many pupils a level of performance that long experience has shown them will not be forthcoming. Neville and Pugh (1982) speak of a

French school of thought which holds that schools not only fail to encourage reading: in the case of fiction, the ways in which they use texts may actually prevent and preclude normal interaction between reader and text.

It seems likely that prevalent classroom practice must be influenced by the reading materials locally available. Multiple copies of the same textbook probably dominate, with almost no consideration of ability differences within the classroom. Barr (1982) suggests that good practice should feature such teacher concerns as discussion and exploration of previous learning and reading in that topic area, consideration of the structure of what is to be read, and the provision of new meanings; in reality, the teacher is dominated by the problem of motivation - getting the pupils to read at all. Classroom management takes priority over learning, and teacher goals reduce to the stark and inadequate imperative: Get through the work. Barr speculates (p.79) about causes: "It is difficult to determine whether the heavy reliance on text book materials and total class instruction ... is an adaptive response to the problems of teaching diverse groups of students, or is itself a source of problems." It is surely both - it is a retreat response in the face of one set of problems; and, in its turn, it creates another set. Many teachers find it easier to circumnavigate print, rather than help their pupils cope with it: lack of apparent ability generates low expectations, and sets up a downward spiral, with increasingly little reading being expected. There may be a general retreat from print, certainly from extended print. The pupil receives less and less practice.

The pre-secondary experience seems generally more positive. The most intensive school reading encountered by Dolan, Harrison and Gardner

(1979), in their survey of classroom reading, was the reading between activities in Junior School. Pupils demonstrated absorbed and extended enjoyment of many different text types, even though a number of these pupils would still be at a 'pre-silent' stage of their development (Neville and Pugh 1982). Further, the primary tradition seems to offer more scope for self directed project work, itself a fairly realistic reading context. Transfer to secondary did not present a positive picture (Dolan, Harrison and Gardner 1979): they noted a marked increase in 'teacher-informing' as a vehicle for learning; there was a significant increase in pupil time spent listening; and an increased reliance on a single class textbook as the primary print source. Of reading as an active interrogation of text, there was little evidence. Science and Social Science texts seemed particularly difficult for children, and both areas tend to use relatively few other text resources, unless it be the prepared worksheet. Copying from sources remains common, something confirmed and emphasised by Spencer (1983), for the Scottish context. This emphasises retention of fact at the expense of organisation and reflection. Reading tends to be very fragmented, dominated, almost unbelievably, by short bursts of less than 15 seconds, where the purpose is to scan or locate, or read a question. Such activity offers scant opportunity for reflection or response, for active intellectual involvement by the reader. Traditional comprehension questions tend to evoke a literal response, and often allow the reader to get by without responding holistically to the text as a unified unit of meaning. Indeed, such questions even customarily structure in a predictability about the location of an answer in the text, and text becomes a kind of bran tub of 'teacher answers': we encourage pupils to become skilled gropers, rather than engage with whole meanings. A reader must be guided by a purpose if the reading is to be meaningful. Such blanket injunctions as 'Read Chapter 14' greatly lessen the likelihood

of the reader perceiving the coherence and logical relationships that embody the meaning of the text. Further, such an injunction implies that all the text should be 'known', that knowledge equals accretion of data, rather than its organisation and inter-relationships. Homework tasks often take this form, and the isolated context of the home may be the least suitable setting for an unskilled reader to make his or her way, unguided by purpose, through extended text.

1.4 The nature of the readers' difficulties

Written text is not easy - it can lack both a common context and supportive non-verbal behaviour; it is uninterrupted and monotonous; it is denser than utterance; and it lacks the cues and clues offered by verbal hesitations, or repetitions. An interruption will not elicit a reformulated message, as it will with a speaker/listener. But, it is permanent, and for the skilled user this holds enormous potential: for return, re-examination, reflection and manipulation, for controlled interaction, interrogation and discussion - for real reading, in fact, a process of comparison and accommodation.

Staffroom anecdote suggests that teachers are aware of 'functional illiteracy' among some pupils - that is, a practical rather than total illiteracy, where some readers seem unable to utilise their literacy towards any functional ends. But the popular response, of 'back to basics', is unlikely to help: the demands upon readers that define functional illiteracy will not be met by mere fluency. Something beyond 'basics' is needed. Where responses have been made, they have had little impact at secondary level: study skills programmes, such as they are, tend to be the preserve of senior pupils, where a degree of latent

ability may be safely assumed. 'Rapid' reading is sometimes encouraged, but can surely do little for efficient silent reading, if it merely develops a faster 'aural' approach (Neville and Pugh 1982). Fluency does not seem a useful concept in silent reading, depending as it does upon oral features of intonation and linearity. Even at their best, school-level responses to difficulties with silent reading have had limitations: even where pupils are presented with realistic reading tasks, through purpose designed topic and project work, and where the pupils are using the materials effectively, they are often learning from a single, pre-digested source. Adults modify their reading approaches and select strategies in response to the function of the text, and their purpose in reading it. School texts and resources are in many ways an unnatural print environment. The milieu lacks a wide range of text types serving a wide range of purposes. Even where they exist, in the form of sometimes lavish resource centres, they seem to interact relatively little with the daily curricular experience of most pupils (and, more important, teachers).

As Pugh and Lunzer point out (1981), reading is not an easily isolatable entity, readily packaged up for neat transfer. It is a range of activities, at various levels of competence. It cannot be glibly disentangled from other processes of thought. Emphasis in both research and teaching has traditionally been at the aural/oral stage (Neville and Pugh 1982), the very sequential linearity of which will impede full exploitation of text. Aural fluency may or may not be an essential prerequisite of silent reading; there is no suggestion that it is not an effective access point to it; but teachers seem fixated by it, and their assumption that effective silent reading will develop from it unaided is all too often false. Reading development can, and should, continue well into and beyond the secondary years. Too often, it seems, it does not,

and readers remain ill-equipped throughout the years of their formal education. Their reading seems structured around 'listener behaviours' - they do not converse with text, they listen to it, starting at the beginning and ending at the end. There is no pause, recap, glance forward, agreement or disagreement, argument or support, lingering or re-examination. They are not consciously aware that there is any other way to read, that different strategies can be deployed to match purpose, style or difficulty. Such readers, if they encounter problems, probably simply give up. They are aware of no alternatives. Probably a main impediment is simply lack of aware purpose - for many readers, reading will appear an end in itself, something schools periodically and irrationally demand of pupils. Given a reading purpose, one is given a base upon which to build. That all too familiar syndrome, the reader who remains unaware of his or her own incomprehension, stems perhaps from a lack of purpose against which comprehension can be measured.

1.5 The purpose of these studies

The problem is an enormous one, and resistant to simple solution. At present, pupils learn, all too effectively, the wrong lesson: that extended reading to grapple with meaning is hard and unnecessary, that successful schoolwork need not involve it. Pugh (1978) suggests that 'The vicious circle seems unlikely to be broken unless someone takes the lead, and draws attention to the importance of silent reading by teaching it.' (p.71). Otto and White (1982) stress the need for two levels of understanding if expository reading is to be improved in schools: on the one hand, a psychological understanding of the processes of reading to learn; but with it a sociological understanding of why present practices prevail. Many writers stress the two-way interaction

of reading, with both text and reader contributing to the creation of meaning. Otto and White remind us that in schools this is not enough: the entire instructional milieu must be taken into account, where a third party, the teacher, mediates in the reader-text relationship.

The present studies are strictly limited in their general aim: to seek to make some contribution to Otto and White's first level, our understanding of the reading processes when a reader is confronted by expository text. Specific aims and emphases were modified somewhat as the studies progressed, to take account of new understandings apparently gained from the studies as they unfolded. Originally, ten text features were to be explored, to consider whether or not their presence or absence affected the comprehension of the typical reader (see Chapter 3). Very early on, two further dimensions were added, to control for two potentially important variables: possible variations in response to these features, by sex and by reading ability. Then it was recognised that the ten studies raised many questions with respect to the different ways in which skilled and unskilled readers seemed to make use of different text features. A second experimental stage was included, seeking to draw together the most promising strands thus far uncovered. There was a threefold intention. It was hoped:

1. to discover how certain features of expository text affected readers, particularly those in difficulty;
2. through this, to consider at what level of processing the main impediments to successful expository reading seemed to be located;
3. and from this, to consider the implications for the ways in which we might intervene, to lessen the difficulties.

CHAPTER 2: THE NATURE AND PROCESSES OF SILENT READING.

The ideas reviewed and developed in this chapter draw heavily upon a view of reading as a contractual process; meaning emerges from a contract-bound exchange between writer and reader. Text on its own has no meaning; through construing the marks on the page, each reader creates his own meaning (Pugh and Lunzer 1981). Each contact must be unique and idiosyncratic, and from it derives the 'meaning' of the text. Lunzer, Waite and Dolan (1979) provide a useful definition of the reading process, and it serves as a framework for this chapter: to read successfully, one needs

'to penetrate beyond the verbal forms of text to the underlying ideas, to compare these with what one already knows, and also with one another, to pick out what is essential and new, to revise one's previous conceptions.'

The definition implies active inter-relationship between several domains, namely:

- (i) the surface features of the text
- (ii) the 'ideas' contained in the text
- (iii) the ideas already held by the reader
- (iv) the changing of these ideas through reading.

Failure to derive meaning can be located in any domain, or in its inter-relationships.

Research, to be useful, must always be specific to a particular theory; data must be gathered and interpreted from a specific theoretical viewpoint. Theories evolve in response to perceived problems at particular times (Weaver, in Kingston 1977). The four domains above, derived from Lunzer's definition, provide both a summary of the current

perception of the problem, and a theoretical framework to build upon. This chapter, then, reviews and considers each of the four domains, as follows:

- 2.1 The Surface Features of Text
- 2.2 The Ideas Contained in the Text
- 2.3 The Ideas Held by the Reader
- 2.4 The Processes of Reading, and Learning from Reading
- 2.5 Reading Difficulties, and the Limitations of Existing Theory

The areas and ideas reviewed are far from conclusive. They leave unexplored and unresolved many questions. The review makes no general attempt to resolve or explore these questions: it does no more than explain the view of reading that underlies and directs the subsequent studies, and thus provide the framework within which the results will be interpreted.

2.1 The Surface Features of Text

2.1.1: Word/ sentence/ paragraph level:

For the purposes of this review, competent oral reading is assumed. Successful processing at the levels of letter perception and phonological encoding is taken for granted among such readers. The extent to which phonological encoding is necessary to access meaning remains an elusive question (see 2.5 below). Given, then, there are no problems with 'words', how may they be combined to facilitate reading, or hinder it? Informative text is characterised by longer sentences,

more complex nominal structures, and many more words per predication than imaginative prose (Kintsch 1982). Pearson and Camperell (1981) point out, however, that short sentences do not necessarily aid processing, if the shortening is achieved at the cost of connectives; while the 'readability' score will be reduced, the load upon inferencing will be greatly increased. Pugh and Lunzer (1981) emphasise the limitations of such 'mathematical' approaches to text: word frequency studies, information theory approaches, and readability formulae do provide simple descriptions of the surface of the text, but at the cost of obscuring both the semantic and syntactic text features, and ignoring completely the reader, the text structure, and the whole process of interaction between text and reader. Graesser (1981) provides a vivid example of the overload that can stem from syntactic variations - his two examples contain the same propositional content (see 2.2 below), but the temporarily incomplete propositions in the first make relatively greater demands upon the STM:

- The woman who loves the poem that I wrote is a phony
- I wrote a poem that is loved by a woman who is a phony.

This is a well researched area. The rules for within sentence construction are familiar and well explored. Sanford and Garrod (1981) point out how much less this is true of suprasentential constructions, with the exception of the work on narrative structure (story grammars). Kieras (1978), like Graesser above, was concerned with the effect of different structures on the working memory load. He found 'bottom-up' structures to be less well recalled than 'top-down' structures (see 2.4 below): the top-down structure, by providing a binding theme, allows incoming information to be more easily integrated. This would apply at any level, from whole text to paragraph, and below. The same idea can be

seen in the three paragraph forms suggested by Bissex (in Gilliland 1975):

- Inductive - point 1, point 2..... point n, conclusion/
generalisation/ moral
- Deductive - generalisation, etc, point 1, point 2, point n
- Balanced - point 1, point 2, point n, generalisation/ contrast,
etc., point n+1, point n+m

For Kieras, and others (see 2.4 below), the deductive structure should minimise processing demand on the working memory.

2.1.2: Whole text level

The 'top-down / bottom-up' dichotomy has even greater importance, perhaps, at the whole text level; delaying the main idea until the end of the passage can cause some difficulty, more particularly to the less skilled reader (Pugh and Lunzer 1981). So, too, can low prominence to 'if/ then' relations. Schnotz (1984) draws upon the ideas of Grimes (1975, 1978), and analyses whole texts along three dimensions: content, cohesion, and staging. The content dimension refers to what the text says, the statements made, and the semantic relations between them. Cohesion refers to the way in which statements are connected to earlier statements (see 2.4 below). Staging refers to emphasis, the relative importance of the elements of the text. Kieras (1985) suggests that while macrostructure building depends primarily upon the propositional content of a passage, it is also guided by surface structure. Whether a referent appears as the surface subject of passage sentences affects perceptions of its thematic importance; also initial position in the passage is the most popular location for important information, and uniquely important. A second important location is the end of the

passage. If an obvious candidate for a main idea appears first, then the reader needs only adopt it and then test it for adequacy while reading the rest of the passage.

Text types, and categories of text organisation, have attracted much interest. While this project addresses 'expository' text, implicitly defined by exclusion from narrativity, it is unhelpful to think of this, or any text type, as a clearly isolatable entity. It is more helpful to think of a continuum (Graesser 1981), a shifting range of types and organisational features. Such features may apply to any size of unit (Herber 1978) - paragraph, chapter, or whole book - and any stretch of text may involve several such types and features. But, Herber suggests, one will usually predominate. Narrative structure, which has received much attention, least needs it: it is normally read linearly. Informational text will probably not be read linearly by the effective reader - hence knowledge of structure, far scarcer, is of potentially greater benefit. Shebilske and Reid (1979) carried out eye movement studies on texts previously used by van Dijk for structural analysis based on subject recall. They found that reading rates and strategies did vary with the different structures found in text. Pugh and Lunzer (1981) suggest that without such structures texts would be impossible to follow (though greater advantage accrues to the better reader: he is better able to note the emerging logical structure, and utilise it). Awareness of text structure directs eye movements (Just and Carpenter 1980), so that the eye fixates on the point that will yield most information: while it is the eye's peripheral search guidance that directs where the next fixation is to be, the information gained through this peripheral search will be mediated by cognitive awareness of text structure. Vesonder (1979) showed that science students had a better grasp of prototypical structures for scientific reports than did non-

science students, and used this knowledge to facilitate processing. Pearson and Camperell (1981) emphasise the high level of predictability needed if such schemata (see 2.3 below) are to be established. Frequent exposure to predictable structures is needed, something perhaps rarer than generally thought.

What, then, are these structures, text types, and organisational features? Graesser (1981) makes an important point: any categories cannot be rigid ones - instead, texts should be seen as varying along a number of genre dimensions. But while categories are not discrete, and may be thoroughly fuzzy at their limits, he does regard them as psychologically real, in that adult subjects can allocate texts to them with adequate reliability. While this may raise questions for the cultural or experiential basis for 'psychological reality', it serves the present purpose. Graesser's (1981) categories, or genre dimensions, include descriptive, expository, narrative and persuasive. These are familiar terms; others refer to informative text (Neville 1985, Mullholland 1984, 1985); Fyfe and Mitchell (1983) speak of factual text, and suggest it fall into two categories, reference and exposition. While there seems some synonymity among these terms, it is as Graesser suggests: the lack of precisely delineated definitions seems to pose no problems of ambiguity - they are more intuitive references to the purposes of the text than attempts at definition.

Davies and Greene (1984) distinguish between writing to communicate and writing to inform. Their particular interest was science texts, which, they suggest, are arranged around the structure of the underlying information. Pupils, once aware of these structures, use them as a meaning framework, a frame, with information slots to be filled (see 2.3 below). If one information constituent is encountered, certain others

are expected; e.g. if encounter an 'Apparatus' section, expect subsequent sections on Materials, Procedure, Results and Interpretation. They posit three broad categories of science text: activities / phenomena / ideas. Within these categories may be found seven information structures: instruction / classification / structure / mechanism / process / concept-principle / hypothesis-theory. Such structures may be mixed; further, some texts may simply lack structure. Hoey (1979), in collaboration with Winter, saw factual texts as being organised around the following: Situation; Problem; Solution; and Evaluation. The first and last they regard as optional. Pugh and Lunzer (1981) draw attention to an apparently dead tradition, that of rhetoric and dialectic: text can be seen as response to a series of implied questions. This provides a particularly interesting insight today, with current interest in text as a dialogue between author and reader.

Meyer has been influential in the investigation of text structures; she sees (1975, 1981, 1984) four primary discourse structures:

- adversative (contrast pattern)
- covariance (cause-effect pattern)
- response (problem-solution pattern)
- attributive (list-like pattern).

Fyfe, Mitchell and McPhillimy (1983) suggest five structures:

- main idea, with supporting information and argument
- comparison/ contrast structures
- cause/effect
- sequence structures
- simple list.

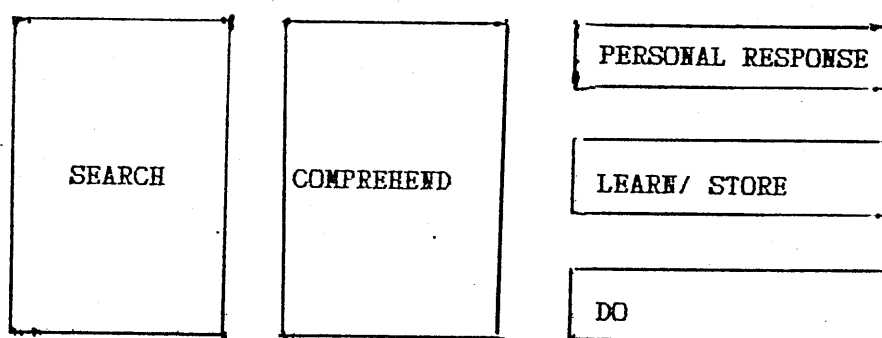
In emphasising the importance of recognising and using such structures, they stress the role of the author's signalling devices. They suggest that structures are usually clearly signalled. Herber (1978) suggests

four structures, and specifies examples of the signalling words involved in each;

- cause/ effect: because, since, therefore, as a result, nevertheless, accordingly, etc.
- comparison/ contrast: however, but, on the other hand, unless, although, etc.
- time order: not long after, now, then, before, firstly, etc.
- simple listings: to begin with, next, then, finally, etc.

As before, the overlaps and lack of precision among these categories do not cause undue concern: they are all recognisable 'psychological realities'.

Fyfe and Mitchell (1983) approached the problem from a different angle. Seeking a workable, uncontroversial descriptive framework that would encompass the very varied reading tasks of a secondary English classroom, they focused upon and categorised reading activities, rather than the text.



A telephone directory would thus involve a search/ do-activity; reading a poem would be a comprehend/ personal response; revising from a geography text would probably involve a search/ comprehend/ learn and store sequence. They suggest that most reading encounters can be

classified with combinations of these groupings. Such an approach is not an alternative to more text-based classifications, but it does powerfully complement them.

2.2 The ideas contained in the text

Kintsch (1974) suggests that the meaning of a text, in terms of its final memory representation, can be captured by its underlying propositional content. His propositions are predicators followed by one or more arguments; they can embed one within another, and subsume each other, so that a text can be represented as a hierarchy of propositions. The uppermost, more dominant ones are recalled more easily, and correspond to the gist of the text. The lower levels correspond to the supporting detail, and are less easily recalled (Kintsch and Keenan 1973). The number of propositions affects reading rate (Kintsch and Keenan 1973); they concluded that propositional analysis provides a useful description of a text, and forms a significant element in the process of comprehension. Kintsch and van Dijk (1978) formalise the different levels and their roles with the terms macrostructure and microstructure; in the microstructure, all the propositions are reflected as a network; the macrostructure, used in summary production and recall, represents the gist. Sanford and Garrod (1981) suggest that while gist can be nebulous and hard to define, it does tend to be reliably recognised and agreed upon, and to constitute recall. Story grammar work (Rumelhart 1975, Thorndyke 1977) confirms this: recall protocols, presenting the gist of the stories and folk tales, correspond to those propositions at the higher levels of a propositional analysis of the stories.

There are other, less precisely defined, terms that appear near synonyms: Fyfe, Mitchell and McPhillimy (1983) speak of idea units. Their lack of definition, however, does preclude their quantitative application. Where propositional analysis is used in this study, a simplified version of Kintsch's analysis is used (Rogers 1978), apparently adequately objective, but probably less so than is apparent. Complete objectivity would involve reduction of meaning to absolute primitives, but attempts to do so seem profoundly counter-intuitive, and subjective judgements do get made in applying such analyses. For example, using Roger's (1978) derivation of Kintsch's analysis, the opening sentences of the two test passages used by Neville (1985) were analysed for their semantic complexity. Both passages were aimed at the P7 - S2 range (11 to 13 year olds), and Neville's study showed that readers consistently found the Informative more taxing than the Narrative. This subsequent analysis did show a difference: the Narrative showed 0.134 propositions per word, while the informative showed 0.177; but the analysis seemed unsatisfactory. No objective bedrock could be reached without meaning units that were patently absurd.

Probably, however, propositions in some form do provide the basic units of semantic structure (Rogers 1978), with knowledge being internalised and recalled in this form. But the concept is only useful if taken in conjunction with a host of other factors: the cohesive relationships between the propositions, the inferencing demands they make (Pugh and Lunzer 1981), (see 2.4 below), the familiarity of the information, and its manner of presentation (Rogers 1978). Graesser (1978) uses the idea of relational density, the number of semantic relations connecting statements; both the number of such relationships, and the degree to which they are explicit, affects comprehension. Propositional analysis, then, provides a valuable insight, but no final

clarification. Kintsch's later writing stresses this (1982), suggesting that there is no such abstract entity as 'meaning'; Pugh and Lunzer (1981) make a parallel point when they say that text does 'consist' of sentences - it is realised by, or encoded in, sentences. For Kintsch and others the meaning of a text is defined only for a specific comprehension episode, one reader at one particular time, and is not an absolute entity in any sense.

2.3 The Ideas Already Held by the Reader

2.3.1 How does the reader contribute? The need for schemas.

The two preceding sections attempted to deal with some text centred aspects of reading. It proved difficult to do so without frequent forward reference, reference to this and later sections, where the role and involvement of the reader's contributions are examined.

The work done in the field of Artificial Intelligence has provided many insights. It has demonstrated that, for computers at least, comprehension depends unequivocally upon available knowledge of the world (Schallert 1982). Text is not represented in the reader's mind through purely text-based elements, but through some sort of model of the world to which the text is referring (Sanford and Garrod 1981):

'... human understanding of discourse is not intrinsic in the semantics of words, but depends upon pragmatic knowledge, or knowledge of how things normally work, rather than how they necessarily work

What is presented in the text is a fragmentary description of situations of which we have knowledge.' (p.53)

Children learn language precisely because they possess a well developed capacity to make sense of situations (Donaldson 1978). Donaldson offers for consideration two adults encouraging an infant to walk: the child carries out the instruction not because it is understood, but because the situation is understood, and the intentions of the participants. Such understandings are constantly enlarged, developed and adapted by a process of hypothesis construction and testing, a continuous, natural and largely unconscious human activity.

Resnick (1984) adds to this, in saying that readers 'construct' rather than 'receive' knowledge. They have a plan, a blueprint, to guide this construction (Donaldson's situational understandings). There are many terms for these blueprints, again many of them apparent near synonyms: scripts, stereotypes, themes, roles, models, scenarios, schemata/ schemas, memory organisation packages, frames, and others (Graesser 1981) 'Schema' seems the most widely used generic term; where it is used in this study it is used in that generic sense. The expectations implied in story grammars can be regarded as schemas, or story frames (Rumelhart 1975, Thorndyke 1977). The frame is a knowledge structure in the mind of the reader, used by a reader to interpret the input (Sanford and Garrod 1981). The frame's slots are instantiated with incoming propositions from the text. Discourse never occurs in a vacuum; even single sentences are uttered or written for a purpose, and so relate to some knowledge domain in the head of the speaker/ writer, and (hopefully) the listener/ reader. Sanford (1984) invites introspection about the mental 'double-take' involved in reading this sequence of events:

1. John was on his way to school.
2. He was very worried about the Maths lesson.
3. Last week he had been unable to control the class.

His explanation is intuitively most convincing: a scenario is elicited with '1'. It operates smoothly with '2' (primary processing - see 2.4 below). Then, with '3', the scenario fails to predict, is rejected, and a new, more appropriate one elicited (secondary processing - see 2.4 below). As Rumelhart (1981) puts it, once established, a schema offers 'a richness which goes far beyond our observations' (p.10). A single surface structure may have multiple deep structures, but not present any ambiguity within its discourse structure (Smith 1978): 'the chicken was too hot to eat' has different meanings in agricultural and restaurant contexts, but the ambiguity is unlikely to strike a reader who encounters it in a natural context.

Such schemas emerge from extended experience of specific exemplars - they are not entities which can be formed and studied in experimental situations (Graesser 1981). They have variables which can embed one within the other; they vary in abstractness; and they represent knowledge rather than definitions. They operate simultaneously at many levels, from letter shapes upwards. Pugh and Lunzer (1981) term a top-down analysis (see 2.4 below) a macrostructure, while information at a propositional level forms the microstructure. Bottom-up analysis assumes that reading depends on the input; but comprehension as such must involve prediction, and the use of prior knowledge, in top down processing. Comprehension cannot happen without prior knowledge. The brain is a predicting organ (Sanford and Garrod 1981, Smith 1978); Smith sees the brain as a system, 'an intricately organised and internally consistent model of the world, built up as a result of experience, not instruction, and integrated into a coherent whole as a result of

continuous and effortless learning and thought What we have in our heads is a THEORY, a theory of what the world is like, and this theory is the basis of all our perception and understanding of the world; it is the root of all learning. If we can make sense of the world at all, it is by interpreting events in the world with respect to our theory.... The theory fills our mind. We have no other resource.' (p.79). Unempirical, evangelical, armchair theorising it may be, but it provides a neat statement of the cognitive context for schemas.

2.3.2 The nature and functioning of schemas

Smith (1978) contends that the brain is in a condition of continuous prediction. Discourse produces models of situations in the reader's mind (Sanford and Garrod 1981), and the reader is under some form of contract to relate all discourse to such models. Minsky's frames (1975), Schank's and Abelson's scripts (1975, 1977, 1982), Sanford's and Garrod's scenarios (1981, 1984), are all predictable situational sequences which provide a set of expectations about the unfolding situation, which are used to interpret and organise the received information. Rumelhart (1981) calls them schemas: a data structure for representing the generic concepts stored in memory, and coded in terms of typical or normal situations or events which instantiate that concept. The words 'typical' and 'normal' recur: Graesser (1981) describes schemas as generic knowledge structures that guide the comprehender's interpretations, inferences, expectations, and attention: they are structured summaries of the components, attributes and relationships that typically occur in specific exemplars. Voss (1984)

describes knowledge acquisition as a process of pattern learning, a gradual process in which new concepts and relations are constructed if they are not identified as components of the existing knowledge structure. These patterned constructions are schemas. Schank and Abelson (1977) describe situational knowledge as scripts. They do not include every underlying primitive, but are 'incomplete descriptions of an action sequence'. Sanford and Garrod (1981) point out that while a scenario will be largely stereotypic, it will be in part wholly idiosyncratic, stemming as it does from the individual's own experiences. Scenario selection will be equally idiosyncratic and experientially based: 'rider' may may evoke a stable scenario for one, a bicycle for another. Their scenarios are information networks called from the long term memory by a particular (in the case of discourse processing) linguistic trigger; there are many varieties and levels, varying widely in complexity. Once a scenario is evoked, understanding becomes a process of checking the scenario predictions, and adding, adapting, infilling detail, noting discrepancies, or rejecting the scenario.

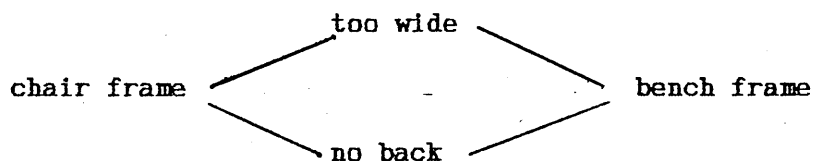
All these definitions stress incompleteness. Minsky's frames (1975) are partial plans of what to do and what to expect, hierarchical data structures based on situations. Their defining characteristics are usually found at the upper levels, the more optional ones lower down. There are many types:

- frames for objects e.g. recognising a cube
- temporal or programmatic frames e.g. what to do in a restaurant
- mixed frames; e.g. a birthday party, a mixture of event sequences and things one can expect
- grammar frames; many cognitive scientists see verbs as frames, which allocate other parts of speech into relationships with the

verb. The verb forms the centre of the action or state described in the sentence in which it appears

- narrative/ text frames; regular and predictable text structures
- scientific paradigms.

These frames form the basic building blocks of knowledge, the memory consisting of millions of them. Normal expectations are called default values, and instantiating these default values is regarded as filling a slot. In a football match frame, for instance, the default value for the number of players per side is eleven. If the spectator fails to count them, he will fill the slot by default, his expectation of eleven players. If, in fact, one team has only ten players, the instantiation is deviant. Such instantiations are noticeable and memorable. Apparent errors of memory occur when a deviant instantiation has gone by unnoticed, and the slot filled by default. In reading, Minsky suggests, the situations encountered will be partial descriptions only, and frames are needed to develop fuller understanding. The frames may be embedded one within another: the 'pay bill' frame is embedded within the 'restaurant' frame. A larger frame may have sub-frames; these may represent a change of roles, the waiter sub-frame, for example, varying for the customer, the manager, the chef, the waiter himself, and so on. Frames may be related by advice/ similarity networks, where the frames are linked by 'family resemblances', and mismatches act as pointers towards more appropriate frames. Frames, then, are not just descriptive: they are procedural - they pose tests to be applied to the environment, e.g.



There seems fair consensus over the properties of these information packages, even where their names differ. Rumelhart (1981), for example, lists the characteristics of his schemata as follows:

- they have variables
- they can be embedded one within another
- they represent knowledge at all levels of abstraction
- they represent knowledge rather than definitions
- they are active processes
- they are recognition devices, whose processing is aimed at evaluation of goodness of fit to the input data
- they consist of levels of sub-schemata, down to elementary schemata which correspond to primitives.

For Schallert (1982):

- schemata are abstract structures that represent what one holds to be generally true about the world; they represent knowledge rather than definitional information
- the structure of a schema is expressed as a specific configuration of variables
- some variables are obligatory, some not
- a particular ~~schemata~~ is embedded within another ~~schemata~~, and itself contains sub-schemata
- the configuration of schemata making up one's knowledge is not static, but dynamic, and changes from moment to moment in response to processing demands. Elements shift constantly in relation to each other
- schemata develop, becoming more elaborate and specific with experience.

There is consensus, too, that they function simultaneously at every level of cognition. They are the agents of both processing and the

forming of memory representations (the implied assumption here is accepted, that the means of storage, reflected in recall, throws light upon the means of processing.) The total set of schemata instantiated at any one moment constitutes our internal model of the situation we face. They are searched for and accessed in response to triggering cues in the environment (the text, in the case of reading), and provide the main vehicle for the interpretation of that environment (Sanford and Garrod 1981). In this way, much of the computation required is already done, the more so the more familiar the situation; they provide the mechanism by which we recognise the familiar; they provide for extensional aspects of meaning, as well as intensional aspects; they provide a connection between knowledge, and the procedures for using knowledge. They explain our facility for remembering the deviant, the items that clash with the scenario: Graesser's tags (1981), and Sanford and Garrod's 'weird list', the memorable misfits (1981). They explain, too, distortion of recall, and the nature of its deterioration over time: it is gist that endures, while surface structure quickly fades (Kintsch 1977, Sanford and Garrod 1981). Bartlett, studying memory in 1932, showed just how strong is the tendency to reconstruct partly remembered events into a prototypical pattern. The systematic distortions that creep into recall are often stereotypically based; also, memory contains both what occurred, and the inferences needed to understand the occurrence - the two seem indistinguishable (Sanford and Garrod 1981). Garnham (1979) working on recall, demonstrated the role of a non-linguistic knowledge-based model of a situation in directing recall; for example, the recall cue 'cooked' was less helpful than 'fried' in prompting recall of the sentence:

'The housewife cooked the chips.'

2.3.3 Concept storage and deployment

The case for the role of some kind of organised package of situational knowledge in interpreting the world is strong. It is generally accepted. But it is not enough in itself: there must be processing elements that precede schema deployment, and executively direct that deployment. Just and Carpenter (1984) distinguish between two kinds of knowledge:

- declarative knowledge, represented by schemas, all schema theories having important similarities:- organised storage, with elements of knowledge mutually linked and accessible, and default values that are likely to be correct inferences; schemas filter and allocate knowledge, fitting potentially isolated facts into a conceptual structure
- procedural knowledge, the 'knowing how to' knowledge involved in performing any action, including mental actions. Such knowledge, they say, is implicit in comprehension, but cannot be spontaneously described.

The situational nature of schemas has been stressed: most examples use sequences of actions and intentions in the real world. Schank and Abelson (1977) suggest that scripts may aid comprehension, but they are not essential, comprehension being organised on the basis of goals and plans. Scripts are no more than situation specific fragments of planned behaviour which are convenient to organise situationally. Sanford and Garrod, too, suggest that understanding can emerge in the absence of a script (1981), the comprehension framework being provided instead by a network of goals and intentions. Also, and apparently separately, they posit the existence of an 'inferencing rule' where no script exists, quoting as an example:

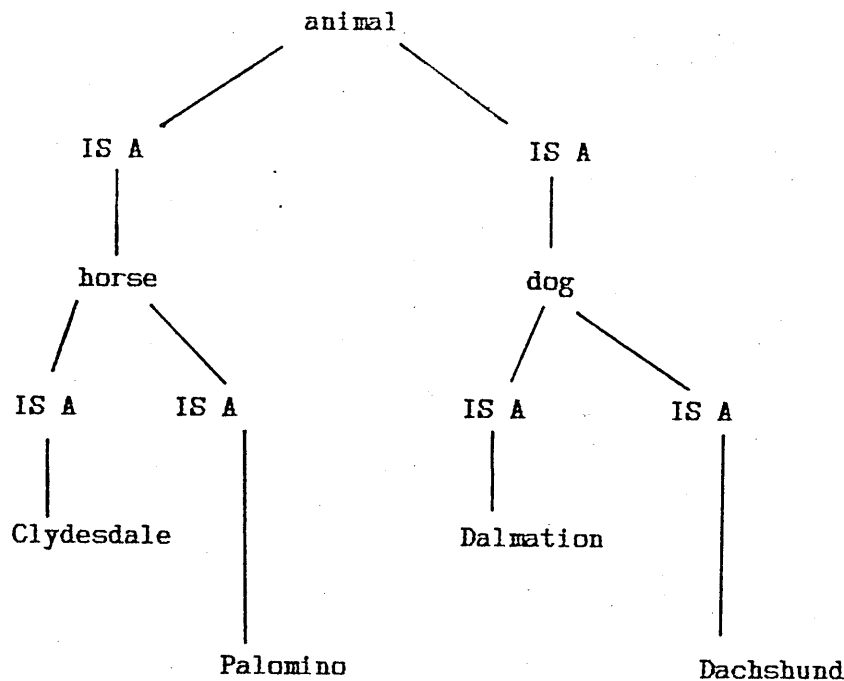
"At the puberty rite, little Kamathi's mother dropped her shoga.
The crowd drew back in horror."

Understanding is inferentially based, they say: if horror was shown, something wrong had been done. They imply that 'inferencing' instead of 'script' has mediated understanding. (At this stage, the lack of precise definitional distinctions between the different forms of schemas does become troublesome; presumably the 'horror inference' must have been culled from some situational experiences, packaged and inter-connected in some form?

Is there a place for representing and storing information about concepts in a non-situational way? Artificial intelligence workers evolved the idea of semantic networks (e.g. Quillian 1968), where a network is a complex inter-relationship of nodes and arcs. Nodes represent concepts, and arcs link the nodes. For example, in

BIRD ———→ IS A ———→ ANIMAL

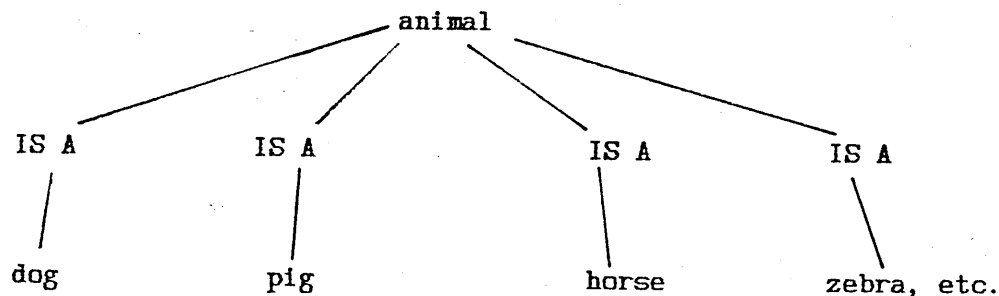
the nodes are BIRD and ANIMAL, and the arc is IS A. In the form of Generalisation Hierarchies, they are an efficient way of organising concepts according to shared semantic components (Sanford and Garrod 1981):



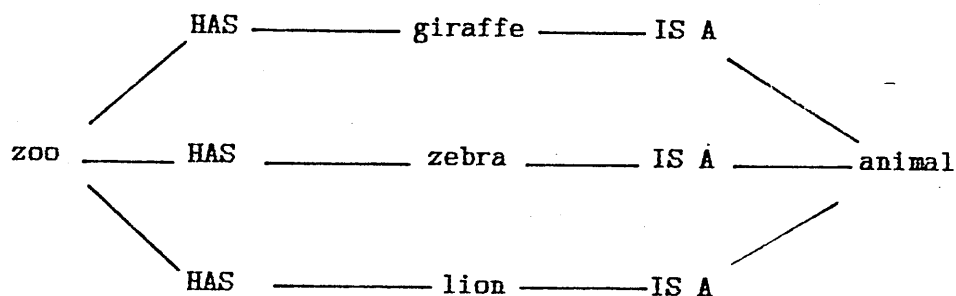
Any concept below another concept in a hierarchy will share all the features of the higher concept, plus some additional distinctive features. Such a pathway provides a pathway for inferencing, linking explicitly stated ideas to further ideas: given the explicit statement that a dachshund is a dog, one can infer that it is an animal. Further networks tell us that it HAS A tail, four legs, and so on. Because of the stored proposition that DOGS HAVE TAILS, there is no need to store endless separate instances, one of which would be DACHSHUNDS HAVE TAILS; inferencing is traded off against storage. This organising principle, to minimise direct storage, is known as cognitive economy (Collins and Quillian 1972). Sanford and Garrod (1981) support a weak form of the cognitive economy theory: strict cognitive economy would be most useful in unfamiliar settings, where inferencing along network paths is the only option; in more familiar circumstances, degrees of direct storage can be assumed. At the level of word semantics, they make two central points: it is useful to think of word meanings in terms of sets of

primitive components, the word's intrinsic, intensional characteristics; while the best way of characterising a word's extensional characteristics is in terms of procedures which embody tests for those components. At the level of individual propositions, the verb is central, allocating other elements into relationships with itself.

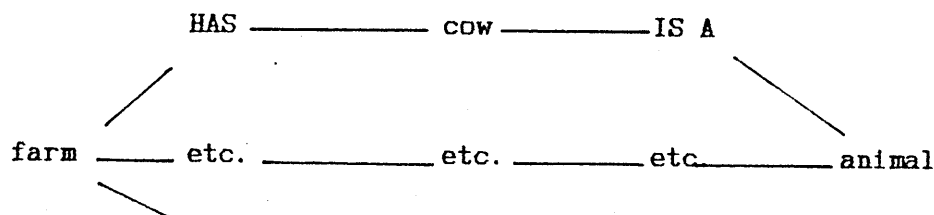
Even yet, though, these ideas are not clear alternatives to situationally organised frameworks. Given that knowledge is gathered into related clusters, there is a need to be able to move between clusters and nodes in a search. Sanford and Garrod (1981) suggest these clusters are situationally organised, in usage contexts, i.e. the clusters are stored in a largely situation determined way. Thus, if a subject is asked to list all the examples he can of an animal, he will not access the kind of animal generalisation hierarchy shown below:



Instead, he will access situations where he might encounter animals, thus utilising a situational organisation as a way of accessing an apparently non-situational concept:



and having exhausted this, moving on to:



Once again, then, pre-existing situational structures are seen to dominate our cognitive processes.

2.4 The Processes of Reading, and Learning from Reading

The last section looked at schema functioning in general terms. This section considers schema functioning during reading. As there exists no generally accepted theory of learning, or learning from text (Voss 1984), no distinction is made in this review between reading and learning from reading, unless specifically stated; 'effective reading' is regarded as synonymous with 'learning from reading'. Learning involves using current knowledge to acquire new knowledge i.e. the further development of existing knowledge structures. Clearly, this reflects the definition of reading around which this whole chapter is constructed. A distinction is made, however, between reading and studying (Anderson 1980): studying is reading that is strongly criterion oriented, and in schools it is usually an externally imposed criterion.

2.4.1 The nature of reading

Again work in artificial intelligence has been seminal. Schank lists what computers had to know how to do if they were to understand simple stories (1982):

- make simple inferences
- establish causal connections
- recognise stereotyped situations (scripts)
- predict and generate plans
- track people's goals
- recognise thematic relationships between people and society
- employ beliefs about the world
- access and utilise raw facts.

Returning to human readers, and leaving the narrative emphasis, Sanford and Garrod (1981) state that 'the basic issue is this. On the page before the reader is a linguistic object, be it a single sentence or a larger piece of discourse; and in the mind of the reader reside knowledge structures of various kinds. By reading, the words and sentences somehow manipulate these knowledge structures in order to produce a unique configuration, which is the representation of the meaning of the discourse.' (p.38 Sanford and Garrod 1981).

Sanford (1984) develops this idea, defining discourse as a set of instructions to the reader to modify and manipulate the contents of his memory: 'The reader attempts to find a referent scenario - some piece of knowledge which he possesses - and appends new information in text to this knowledge. If such a mapping can be made, the discourse is understood. If it cannot, the text is really just a list of propositions, albeit inter-connected at times; and lists are notoriously

difficult to retain.' (p.45). Just and Carpenter (1984) speak of text providing only details, the reader already knowing much of what is described - reading is not a bottom up, linear and text driven process, except where difficulties are being encountered (see 2.5 below).

Pugh and Lunzer (1981) warn of the difficulties of isolating reading as a cognitive activity; it involves such a range of activities at various levels of competence that it becomes nearly indistinguishable from such related cognitive activities as thinking. It is not, perhaps, necessary to try to isolate it. Most of the useful schema-based definitions of reading draw upon the notion of 'construction': reading is a progression where the reader builds and refines models of ways of getting at the meaning and purpose of written discourse (De Beaugrande 1984). Meyer (1981) speaks of reading as a conversation between author and reader, one which must follow the pragmatic restraints of conversational behaviour; she sees the text as a subset of the writer's cognitive representation, the reader then having to build 'a similar cognitive representation' (Meyer 1984). Sanford and Garrod (1981) define the writer's sense of audience as his ability to predict successfully the reader's range and repertoire of scenarios. Mandl, Stein and Trabasso (1984) do make a distinction between reading and learning from reading: 'The process of understanding results in a fairly stable representation of what is interpreted. Learning from text also involves comprehension, but results in both the construction of a representation of the text, and in a change in the knowledge base used to understand the text in the first place.' (p. XII). Fischer and Mandl (1984) identify three major goals in learning from text: identify and extract the core information; comprehend it; and integrate it into the existing body of knowledge. Effective execution of this involves an overview of

the text structure and content; identification of the macro-structure and segmentation; allocation of time; and the monitoring of comprehension. Brown, Campione and Day (1981) suggest a tetrahedral model of text processing, with four groups of variables determining the effectiveness of reading:

- characteristics of the learner
- text characteristics
- learning goals
- learning strategies.

Meyer (1981) suggests two groups of variables affecting prose comprehension; the author-related variables:

- content e.g. ideas conducive to imagery are more memorable
- structure
- emphasis

and reader related variables:

- inference
- reader's world knowledge
- learner's perspective
- learner's purpose
- learner's skill level
- learner's predominant processing style.

Schallert (1982) also emphasises that meaningful learning depends upon how well the new information meshes with existing information; it proceeds by changing the current organisation of knowledge, by elaborating a subordinate structure, or by changing the superordinate structure into which the subordinate facts fit. The deeper levels of semantic analysis involve enriching the stimulus by tying it to previously acquired and organised elements. The strength of the memory trace may be seen as a function of the depth of processing. The depth of comprehension is defined by the richness of contacts to existing

memories. It is the quality, not the quantity, of processing that governs storage (Craik and Lockhart 1972), and the strength of the memory trace that will be used in reconstruction during recall (Cermak and Craik 1979). Readers with high content knowledge will recall more essential information than will readers with low content knowledge (Voss and Bisanz 1985), though there will be little difference in recall of peripheral material. The richness of detail also affects the depth of processing: Black and Bower (1979) found that increasing the number of subordinate actions that elaborate the important actions of a story has the effect of increasing the recall probability of the latter.

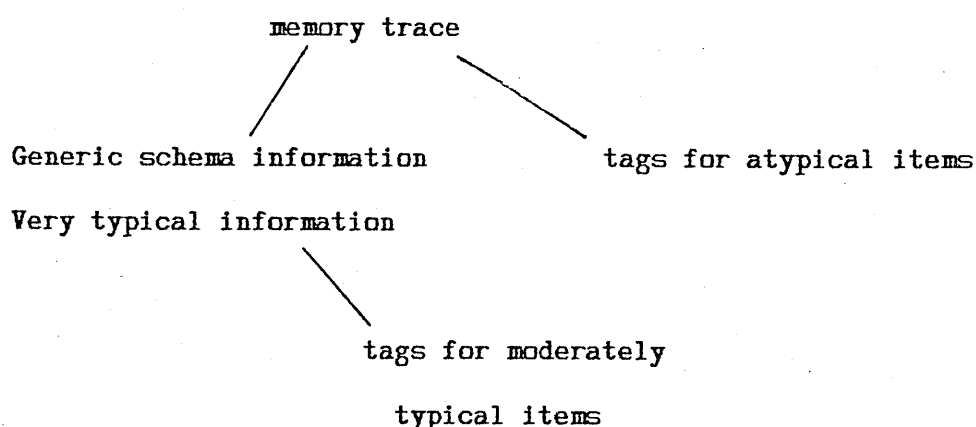
It seems unlikely that widely separated competences are involved with written and oral language; Sticht et al. (1974) assumes a single decoding competence in both 'auding' and reading, so that practice in one transfers to the other (obviously assuming mechanical competence in both modes). Weaver (in Kingston 1979) regards the two modes as being processed identically. The far higher failure rate in reading he attributes to the highly supportive and meaningful context in which oral language develops, a 'life situation' spread over more than five years, while reading acquisition is expected in a less supportive and meaningful context, over two or three years. To view the two processes as identical seems perhaps an oversimplification. There remain certain inescapable differences: in linearity of processing, for example, where the linearity of print can be rearranged and reprocessed, while the spoken word is more inescapably linear and transient. Further, there seems to be, in reading, a 'more careful and locally constrained language processing', while in listening language perception seems 'less circumscribed, and more confident, but also more careless' (Neville 1988). But the similarities are striking; Neville (1988) found little or no general difference between reading and listening comprehension, as

long as the forms of language were the same (written forms). The similarities were more marked than the differences, and children appeared to be responding more to the message than the mode of presentation. The type of text is more significant than the mode of presentation, even among fairly inexperienced readers (Primary 4). Mullholland (1985) confirms this: it is the material, rather than the mode of presentation, that directs the processing strategies. While they found a sex difference in favour of girls in reading, the sex difference in listening, though smaller, was in favour of the boys. King (1959) had found something similar among London 12 year olds - boys did better than girls when material was presented orally, specially if it had a practical or scientific content. For girls, there was little difference between scores on auditory and visually presented material. The reason may be that girls read more narrative, and are thus advantaged when the discourse to be processed is read rather than heard. Possibly, too, girls incline toward the kind of 'careful' and 'constrained' processing involved in reading, while boys do better in the more 'confident' and 'careless' world of listening. The extent of the inter-relationships exposed, between reading and listening to written material, suggests the existence of a strong 'general language factor', a central ability to handle 'literate' language, be it in reading, writing, speaking or listening (Neville 1988).

2.4.2 Schema activity during processing

'The underlying belief here is that the information processing system possesses a large inventory of active, generic, semi-autonomous knowledge structures called schemas schemas are very intelligent knowledge structures each schema does its job according to its

particular content, constraints and rules.' (Graesser 1981, p.35). They function, Graesser suggests, at two levels: a data driven process of schema identification, involving a pattern recognition process to identify a schema that fits certain aspects of the input; and schema application, a concept driven process, where the schema, once identified, directs comprehension. Goodness of fit is evaluated by comparison with the apparent alternatives stored in the LTM; the more distinctive the information array, the fewer the apparent alternatives. Ambiguity arises where more than one schema seems adequate. Once identified, the schema scans the input for images of its elements, and is not fully instantiated until its important variables are satisfied. Once fully instantiated, the input information is structured and inter-related according to the schema's constraints: it guides interpretation; it generates inferences and expectations; it guides attention towards those parts of the input array that are either significant or deviant; when dealing with goal-oriented actions, it receives feedback and adjusts actions. As several schemas may be relevant simultaneously at the same level, they must be able to interact 'horizontally' as well as 'vertically'. Clearly, the resulting cognitive representation of the text is much richer than the linguistic input from which it derives. Graesser terms his model of prose memory the 'schema pointer + tag' model (SP + T):



Meyer (1984) implies something subtly different, the evocation of a 'parallel' schema, an empty storage system that is brought forward and filled up (instantiated) once the structure has been recognised. This storage system is exactly structured to fit the input. Schallert (1982) makes six main points:

- Comprehension proceeds as the values for the variables of a schema are determined and the schema instantiated; the meaning resides neither in the text nor in the awaiting schema, but only in the particular, 'concretised' representation that stems from their interaction, the instantiation.
- Values for variables are determined by an interplay of top down and bottom up processes.
- The significant input information is that which provides a value for a schema variable; that which does not fill a variable, unless deviant, is seen as trivial, sometimes analogous, perhaps, to Trabasso et al.'s causal 'dead-ends' (1984) (see below). Except for the deviant elements, ability to differentiate new from old information is poor. Voss (1984) describes the same phenomenon, of new information merging with existing structures so completely that it is subsequently impossible to specify where or when the information was acquired.
- Some values for instantiating a variable are more typical than other values.
- The activating schema guides inferencing, but whether or not an inference is made depends upon the interpretation being constructed. This was nicely illustrated in an experiment with two passages about a woman catching a plane; she delays to talk to her son. In one passage there are no implications attached to this delay; in the other, it causes her to miss her plane and avoid a fatal air crash. In the 'fatal' passage, the reason for lateness

was correctly recalled. It was much less well recalled in the other.

- Task instructions constrain and aid effective reading. Indeed, all higher level schemata, even at the level of global culture, can constrain the interpretation and acquisition of input information, and the more that is known about a subject, the more effectively it will be processed.

Sanford and Garrod (1981) are specific about this distinction between text and reader information, using the concept of an 'extended domain of reference' to explain the ability to interpret entities implied by the text, but not explicitly mentioned. Such entities are within the scenario elicited and in current use: entities in the text itself are referred to as being in explicit focus; those in the current scenario but not in the text are referred to as being in implicit focus. It is these entities which form the extended domain of reference. They exemplify this with two sentences:

"Mary dressed the baby. The clothes were made of pink wool."

The definite noun phrase "the clothes" refers to an entity set up in the extended domain of reference generated by the word "dressed". Items in either kind of focus are in constant and dynamic shift.

For a scenario to be elicited, the text must constitute a specific partial description of an element of the scenario (Sanford and Garrod 1981). Where there is no sufficiently powerful trigger in the text, elicitation will be 'held off'. In this 'hold off' mode, text amounts to no more than a bald list of propositions, and comprehension of any real kind is not possible. Sanford and Garrod use, too, the idea of primary and secondary processing: primary processing occurs while text content maps directly onto a scenario; when this mapping fails, secondary

processing occurs, the search for a new and more appropriate scenario. Normal informative text should be seen as demanding a dynamic balance between primary and secondary processing: primary processing establishes and sets in motion rapid and 'automatic' comprehension (see below); secondary is called into play as topics shift and develop, as new information is presented. Rumelhart (1981) makes explicit the choices open to a reader when a promising schema fails to account for some aspect of the situation: the schema can be accepted despite the flaw, or an alternative sought. Comprehension is analogous to hypothesis testing, and comprehension has occurred when the reader has found a configuration of hypotheses/ schemata that offer a coherent account of the various aspects of the text. Sanford (1984) expands a little on their earlier ideas: primary processing occurs while any discourse element encountered already has a representation, explicit or implicit, in current focus. When such a representation is not available, secondary processing occurs, involving search acts and inferencing of varied elaboracy. From the examples he gives, it is clear that inferencing often transcends the schema in which it was initiated, so that secondary processing is a form of inferencing, e.g.:

"Joey's brother punched him again and again. The next day his body was covered in bruises" seems to utilise the one main schema, the inference pathways remaining within it, while:

"Joey's mum was furious with him. The next day his body was covered with bruises" suggests that an alternative scenario is sought and found before any inferential connections can be made. These inferential connections, then, form one of the 'horizontal' connections that link schemas in current use.

Clearly there must be, too, constant 'vertical' interaction. Bottom up strategies imply that small units are initially recognised, and

integrated together as they develop. Top down strategies imply that processing starts with large units, and smaller ones are fitted in as processing continues. The size of the initial unit depends upon reader strategy, with the size of unit perceived depending upon the level of processing taking place. Clearly, though, processing cannot be perceived as a dichotomous choice between bottom up and top down processing; processes at all points along this 'vertical continuum' proceed simultaneously and interactively (Graesser 1981), preliminary analysis at low level having initiated the processes. Those schemas dealing with the more primitive units, with restricted domains, are referred to as lower level schemas: for example, at the letter level, perhaps, there will be a schema called into play when a single vertical line is noted in the input - it will be a closed schema, a closed set of choices, containing such letters as t, l, k, etc. Such lower level schemas interact with higher level schemas. Continuing the same example, a 'school' schema may have been evoked at a higher level; when an initial 't' has been identified at the lower level, the higher level school schema directs and constrains the lower level options - the word 'teacher', for example, is a valid option; the word 'tea-time' would be less probable, despite initial perceptual similarities. Rumelhart (1981) describes these influences as data-driven and conceptually-driven processing, the data-driven schemas operating at the feature detection level, cumulatively combining to activate higher level schemas, thereby initiating an ongoing interaction between levels. As each subsequent level attains goodness-of-fit, it activates still higher level schemas, combining ever larger constituents of meaning. As each higher level is confirmed, it activates, top down, its own sub-schemas to further direct and constrain the lower level processing.

Garrod (1984) uses similar reasoning to explain the relatively more efficient utilisation of lower level processes by more skilled readers. The greater the potential redundancy of the input, the more effectively can it be utilised; if a knowledge resource is packaged as a closed set, it may be more effectively used. Finite sets, such as the perceptual features of letters, will be efficiently used; the more higher level scenarios that are invoked, the greater the constraints on the lower levels, further closing the sets of knowledge involved, and constraining probable lexicon, thereby optimising efficient processing. His two sample sentences illustrate nicely how different scenarios close and limit choices for all aspects of a situation:

"Keith drove to London" and

"The farmer drove across the field".

Each provides a relatively closed set of choices for vehicles, clothes, purposes, and so on. Garrod suggests, however, that while such scenarios provide a modicum of predictability, their real potential is in identifying events which do not fit; the most important function of scenarios is in providing a kind of mental anchor rather than precise prediction. Risko and Alvarez (1986) showed how an advance organiser, by activating an appropriate set of higher level scenarios, improved both recall and the ability to elaborate upon implied information.

Meyer (1984) focuses upon the schemas the reader may have for the structure of the text. She implicitly defines comprehension as the construction, by the reader, of a cognitive representation of the topic similar to that of the writer. Such a definition obviously emphasises structural and organisational features of discourse. She suggests three levels of text:

- a top level rhetorical structure, a schematic superstructure
- the macropropositions, the top three or four levels in the content structure, equating to the gist and the main ideas
- the micropropositions, containing the detailed information.

The skilled reader seeks and uses the top level structure, searching for an organisational plan that will subsume all or much of the information into a summarisable whole. Relationships are then developed between the primary thesis and the supporting detail, with each proposition being referred back to the top level schema for guidance about how it should be encoded. Her investigations rested upon the following dimensions of text:

- emphasis: normal emphasis, where the top level structure and organisation emphasises high level information;
differential emphasis, where low level information is foregrounded;
- top level rhetorical structures/ organisational plans (see 2.1.2 above): description, collection, causation, response, comparison;
- characteristics of subordinate detail: specific or general.

Where the reader cannot utilise a structure strategy, the default strategy will be simply to try and remember something from the text, or to utilise some other, perhaps irrelevant, schema. Mnemonics exemplify this.

2.4.3 Inferencing

Inferencing is perhaps the major process through which schemas provide understanding. Once a schema is instantiated by the text filled slots, it provides a network of links and pathways. Trabasso (1981) speaks of two kinds of inferencing:

- text connecting, to find the semantic or logical relations between propositions or events;
- slot filling, where missing information necessary to make such connections is filled in.

Understanding (a story) is essentially a chronology of alternating events and states, with causal links between them. The causal links may be inferred or explicit. Inferences are not separable products of a process called inferencing (Schallert 1982); they are a natural, pervasive and ordinary consequence of comprehension. The quality of the inferences reflects directly the quality of the schemata available and activated. Flood (1981) identifies six broad categories of inferences, text specific or text external:

- generating macro/microstructures: creating larger or smaller units to accommodate text information;
- generating cause: placing an event in a framework;
- generating dimension: creating a temporal or spatial framework;
- accommodating referents: establishing appropriate referents for ambiguous text elements;
- generating case frames;
- generating attributes.

Sanford and Garrod (1981), drawing on unpublished work by Trabasso et al., suggest four basic categories of inferencing:

- lexical inferencing: solves problems of lexical ambiguity and nominal references;
- inferences of space and time;
- extrapolative inferences: the reader extrapolates beyond what is given to provide a sequence of intervening, linking events. Their example is delightful and vivid:

"Jill came bouncing down the stairs

Harry rushed off to get the doctor."

"Harry rushed across and
kissed her."

- evaluative inferences, where the significance of an event depends upon its context.

Trabasso (1981) uses three sentences to illustrate the vast range of knowledge and assumptions we bring to bear when we generate inferences.

The sentence "Mary had a little lamb" may be followed by:

"Its fleece was white as snow"

or "She spilled gravy and mint jelly on her dress"

or "The delivery was a difficult one, and afterwards the vet needed a drink."

Inferences, he suggests, perform a wide range of tasks:

- they resolve lexical ambiguity
- they resolve nominal and pronominal anaphora
- they establish larger frameworks for interpretation, by eliciting appropriate schemas.

He sees four prerequisites to inferencing:

- appropriate knowledge domains
- vocabulary knowledge
- text structure awareness
- causal relationships.

Comprehension (of stories) depends upon the ability to construct causal chains. This involves forming conceptualisations of the sentences, then linking them by generating inferences. He suggests that children can understand individual sentences before they can link them inferentially.

Graesser (1981) defines causal conceptualisations as a network of states and events causally linked. The chains explicitly mentioned

represent little more than 'highlights', while the comprehender constructs more detailed conceptualisations to explain what is explicitly stated. At their most basic level, they are captured by a network of EVENTS and STATES, with three types of links: LEADS TO, ENABLES and RESULTS. In causal systems, events and states are driven by past occurrences. Intentional conceptualisations, however, are future directed, where a goal embodies some desired future state.

For some writers, it seems that causal chains can be sufficient representations in themselves, at least of narrative. Others, as has been shown, seem to see them as only one aspect of the representation. Trabasso, Secco, and Van den Broek (1984) believe that narrative at least can be adequately represented through causal chains. Early 'setting' statements allow a causal field to be evoked; as the facts are established, they are ordered into a causal chain. Given a new event, expectations are instantiated by backward inference to the events causally prior to it, the process continuing as long as links to other nodes exist (i.e. expectations continue, and are instantiated). When there are no new expectations, and prior expectations are either instantiated or disconfirmed, the causal field closes. Events may be on a chain, or on a dead end, and the comprehender seems to edit representation so that dead end events are not recalled. The greater the proportion of a story's events that are on the causal chain, the greater the coherence of the story, and the more memorable it is. They found strikingly linear relationships in support of this.

2.4.4 Memory and cognitive resources

Clearly, however, the proportion of events on the causal chain cannot be the sole arbiter of text difficulty, however linear the supporting relationships found in simple narrative. There are causal links involved in

'Joey's big brother punched him. The next day his body was covered in bruises'

and in

'Joey went to the neighbour's house to play. The next day his body was covered in bruises',

and in both cases the events are on the causal chain. But the latter involves more demanding inferencing. Perhaps because of that, it is more likely to be recalled. The quality and inter-connectedness of the memory representation depends upon the amount of processing invested, and the skill of the reader at connective inferences (Schnotz 1984). Well recalled events, too, share the properties of being overt, complete, and imageable states and actions (Trabasso, Secco and Van den Broek 1984). Constructing the representation / knowledge structure involves integrating a linear sequence of propositions into a probably non-linear structure, with connective inferences linking the new to the already integrated. Both must be present in the working memory while being related; thus a proposition often referred to will undergo repeated processing. Also, the temporally closer the two propositions, the more easily can they be linked. This has implications for the ease of processing of different text structures (Schnotz 1984).

Processing capacity is limited. Britton, Glynn and Smith (1985) use the analogy of a 'cognitive workbench': many cognitive processes run concurrently during reading, and the task is so complex that the

capacity of the
/ 'cognitive workbench' is likely to be fully allocated at any one time. Processes need to be moved on and off the bench, and this requires memory management operations. These may have unwanted side effects, in terms of fragmentation, disorganisations, and the presence on the bench of unwanted material. They suggest that lower order processes sometimes loom so large that the higher order, integrative processes tend sometimes to be squeezed off the bench. They advocate text structures that minimise the demands of the memory management processes.

Some components may be processed automatically (Graesser 1981). This does not imply zero processing time or effort; but there will be no conscious, focal attention or effort; it will not be available to introspection, and will be relatively independent of the reader's goals; nor will it be interfered with by other processes. Observation and detection of automatic processing is very difficult. It arises from 'overlearning', exposure to many examples in diverse encoding contexts. Skilled performance has many automatic components (Just and Carpenter 1984), with the lower level processes most likely to become automatic. Automatic processing is evoked by a stimulus without conscious effort; it requires little processing capacity; it is not available to conscious introspection; and it allows for functional parallelism, the phenomenon of complex but highly practised and overlearned tasks temporally co-occurring. Word encoding, for example, may consist of many simultaneous sub-processes, at the level of feature, letter, syllable, word and supra-word.

Most researchers have used reading time as the indicator of how cognitive resources are allocated during reading (Graesser 1981, Sanford and Garrod 1981). Graesser found narrativity the most reliable predictor of reading time, while influence of passage familiarity was surprisingly

small. Most resources go to non-automatic processes, such as conceptual relationships, novel aggregations, and inferencing. Meyer (1984) proposes three possible explanations of the 'levels effect', the greater probability of higher level propositions being recalled: selective encoding; differential frequency of encoding; and differential retrieval. De Beaugrande (1984) reviewed the literature on levels of processing; different tasks will demand concentration on particular levels, so that if, for example, one is editing for spelling errors, a very 'surface' task, little attention will be paid to deeper levels of meaning. There is a trade-off; levels are processed in parallel, but dominance at one level is achieved at the expense of reduced performance at other levels. Six levels are suggested: letter/sounds, words, phrases, concepts/ relations, ideas, goals. A time dimension is included: at any instant, current perception of text emphasises the more superficial levels, while in the predictive and retrospective representations the emphasis is increasingly further from the surface.

2.4.5 Processing at macro- and micro- levels

For Kintsch (1982), macro-propositions represent the global organisation of the sentence content of a passage. The reader first uses morphophonemic and syntactic rules to identify the words, phrases and clauses in a text's sequence of sentences. Then the reader infers from the identified sentences the propositions in the explicit text base, and supplements them with propositions from the implicit text base; this latter derives from the reader's reasoning processes and background knowledge in interaction with the explicit text base. Then the reader uses summarisation rules to construct macropropositions in the long term memory. A hypothesised candidate main idea for the passage is set up as

early as possible (Kieras 1985); it is modified or changed as necessary as reading proceeds. The final candidate is then reported as the main idea. On recall, the reader uses these macro-propositions and any micro-propositions in the LTM, to retrieve and reconstruct the text. This generation of new, summarising propositions that cover relatively large amounts of text may involve the deletion of lower level micro-propositions (Kintsch and van Dijk 1978, van Dijk 1980). As Kieras phrases it (1985), the macrorules essentially 'boil down' the large number of micropropositions to a relatively small number of macropropositions. These are given storage priority, and provide the framework around which recall is constructed. Kieras goes on to suggest that macrostructure processing can proceed on the basis of fairly limited, shallow semantic knowledge of the subject matter. Readers appear able to identify the main content even where surface level markers are inconsistent, or the content is unfamiliar - they seem to use superficial features of semantic relationships and the propositional structure of the passage content. The role of textual surface structure, then, is very important.

The distinction between macro- and micro- levels of processing is clearly significant. Graesser (1981) makes an important suggestion, strongly supported by the findings of, among others, Pearson and Camperell (1981), Levenstone et al (1984) (see 2.5 below), Mulholland (1984): that we view the processing of the micro-structure (linguistic processing) and the macro-structure (the extended conceptual analysis) as involving separate reading skills. It is the latter entity that is notably neglected within the formal curriculum. Our interventions with poor readers focus upon the processing of the micro-structure. Developing ability to process macro-structure (not necessarily always through written text) would improve an important and neglected

dimension; and, through the kind of 'downwash' effect among vertically interacting schemas described above (2.4.3), it would improve at the same time the kind of linguistic processing upon which we traditionally concentrate.

This emphasis has, perhaps, particular implications for our difficulties with the unfamiliar structures encountered in expository text. Specific strategies are appropriate to specific text types (Kintsch 1982); what is stored, and how, will depend upon the operations performed at input (Anderson and Armbruster 1982). Meyer (1984) demonstrated how the interaction between organisational structures and emphases on the one hand, and reader strategies on the other, affected the mechanisms of processing and the formation of text representations. Different structures and emphases stimulate different cognitive representations, and these in turn affect what kind of information from text will be remembered. The distinction between intelligent reading and learning from reading does not explicitly inform Meyer's study, nor does it need to: the implicit assumption remains that representation that permits recall does so simply because of its effectiveness as a representation. Fischer and Mandl (1984) do make the distinction; they speak specifically of learning from text, categorising it along two dimensions: whether it focuses upon macro- or micro- level, and whether it emphasises comprehension or storage. Four types of learning strategy result: comprehension directed macro-structure strategies, aiming at the gist and the main ideas; memory directed macro-structure strategies, involving analysis and noting of text ideas, summaries, etc.; comprehension directed micro-structure strategies, aiming at grasp of supporting ideas; and memory directed micro-structure strategies, aimed at the committing to memory of detail. There are certain parallels with work on student learning. Entwistle (1981) characterised learning

strategies along two dimensions, deep/ surface and active/ passive, to give four learning styles: deep active, deep passive, surface active, and surface passive. Also Pask's holist/ serialist distinction in learning styles (1976): the serialist, leaning towards a bottom up emphasis, may focus initially upon micro-level material, while the holist, preferring a top down emphasis, will give greater initial attention to the macro-structure.

Overall, schema based models of cognitive activity seem both powerful and robust.

2.5 Reading Difficulties, and the Limitations of Existing Theory

The chapter so far has set out a schema based theoretical foundation for reading. Section 2.5 uses this theoretical base to explore some of the difficulties readers encounter, and considers the shortcomings of the theory in explaining the difficulties presented by expository prose.

2.5.1 Comparative reactions to narrative and expository text

That schoolchildren do find non-narrative prose more demanding than narrative was confirmed consistently in Neville's study of language in Scottish schools on behalf of the Scottish Education Department (1985). She looked at three stages: Primary 4 and 7, and Secondary 2 (that is,

children of 8, 11 and 13). The study was recent, large scale, and encompassed the four language modes; its relevance to this study is mainly in the Reading findings, and in the apparently high level of relationship between listening and reading. To assess reading development at each stage, Neville looked at:

- comparative skill with narrative and informative prose;
- any developmental changes in the size of the gap between narrative and informative skills;
- sex differences;
- attitudes to reading;
- specific book use skill such as dictionary skill and reference skills;
- the identification of main ideas.

She also made cross modal comparisons between listening, reading, writing and talking. The results are unequivocal, and raise some intriguing questions:

- All groups found informative text harder than narrative: there were lower scores, poorer free recall, and less fluency in recall. Pupils found it harder to treat informative text as a coherent whole, making less use of cataphoric cloze clues; while in narrative, an overall grasp seemed to carry them forward effectively, they seemed to process informative text in smaller segments, and were thus more hindered by local difficulties. This held true whether text was read or heard. The similarities between reading and listening performances at all levels imply not only a common underlying process (see 2.4.1 above), but also that even by P4 there are sufficient reading skills to allow the deep processing to proceed unhampered by difficulties in the surface processes of decoding.

- Where cloze passages were used, specifically to explore process rather than product, girls were significantly better than boys at P4 and

P7, in both narrative and expository, but there were no significant differences at S2. The comparatively greater difficulty of both the informative prose was significant at all levels ($p < .001$), this effect being most marked at P4.

- Attitudes to reading: no significant sex differences at P4; by P7, significantly more positive for girls, a trend even more noticeable by S2. By S2, attitudes had become more extreme, with scores tending to be either high or low.

- Developmental trends: there seemed a definite slowing down of development between P7 and S2, compared with the significant differences noted between P4 and P7. This applied to most of the skills measured. While skills measured showed a general improvement across the stages, there was little change in the relative patterns of skills: the tasks found hardest at P4 still show an equivalent and significant lag at S2. Presumably then, skill teaching (if any) aimed at lessening these difficulties has not succeeded, the tasks remaining relatively just as difficult.

- There were relatively low relationships between scores on narrative and expository texts at each stage, seeming to suggest that success in reading narrative does not necessarily transfer; perhaps different reading abilities are involved, and the skills acquired and practised in narrative reading are not necessarily appropriate to expository reading. There was no improvement in expository reading relative to narrative reading across the stages.

- In the dictionary test, girls performed significantly better than boys, less markedly so at S2 than at P4.

- When reading study skills were tested across the three stages, five subtests were used:

A skimming and scanning

B1 reference skills (easier items)

B2 reference skills (entire subtest)

C identify the topic sentence

D distinguish fact and opinion

P4 found all these difficult, particularly A and C, with girls performing significantly better than boys. This pattern persisted, but less markedly, with the older children, sex differences becoming non-significant by S2. Again there were no relative changes in patterns; A and C remained harder than B and D.

- While the sex difference pattern was clearly biased in favour of the girls in many of the reading measures (a feature even more marked in measures of writing skills), there was a counter result in some of the listening informative passages, where boys performed better than girls (see 2.4.1 above).

Mulholland (1985), as part of the same study and focussing upon the same ages and variables, analysed cloze responses for both listening and reading. Her findings are most interesting, and cast some further light upon the differences in processing narrative and informative text.

Narrative prose gives rise to more inaccuracies than informative, but inter-sentence connections are better handled in narrative despite this. Narrative is more likely than informative to be treated as a coherent whole; and for the younger and less able, coherence is better handled when listening than when reading. Pupil responses to narrative are more sophisticated, but there is a greater mechanical accuracy with informative text. Pupils seem more constrained by text when making informative restorations, while readier to act imaginatively in narrative. In schema theory terms, there emerges a picture of narrative schemas being used with confident familiarity, even sometimes overconfidence. Readers seem to feel their way with more caution when

using the less formed, defined and familiar schemas they elicit for informative reading.

In terms of processing levels (Kintsch and van Dijk 1978, van Dijk 1980), the reader who is finding difficulty with expository prose may be doing so through insufficient attention to macro-structures. Their protocols tend to be heavy on detail, at the expense of macro-interpretations; there is too little inferencing and constructing of summarising propositions. In terms of a three level text representation (topic, then macro-structure, then micro-structure), poor readers seem to miss the middle, crucial level; they can report what the text was about, and recall details, but are weak at the macro-structure level.

Graesser (1981) had some predictable and some counter-intuitive findings. He varied passages along two dimensions, narrativity and familiarity. He found:

- the proportion of propositions recalled correlated highly with the narrativity ratings
- multiple choice comprehension tests showed a clear correlation between narrativity and comprehension
- familiarity with the topic did not predict recall or comprehension; a slight negative correlation was noted
- only more skilled readers varied their reading time to cope with expository prose.

Using his genre definitions, then, the passage where unfamiliar, active events unfold chronologically is apparently highly readable. He cites work by Britton and Price (Graesser 1981), who looked at apparent cognitive capacity demands while reading different types of text for different purposes. A secondary task was inserted into a range of tasks

(responding to a click). The results are curious: passages that are easier, more cohesive and more narrative appear to demand more resources. Reading time seems inversely related to the amount of cognitive capacity demanded: the greater the demand, the swifter the reading. Anderson and Armbruster (1982) reflect this finding. Are more inferences demanded by narrative? Are the retention mechanisms utilising these resources? Are easy narratives simply more absorbing, and thus more concentrated upon? There seem no simple answers in terms of present theory. Graesser (1981) and Graesser and Goodman (1985) list some of the differences between narrative and exposition that may contribute:

- while narrative is fictitious, the expository reader cannot suspend belief; input is constantly evaluated on the basis of the reader's own knowledge;
- episodes in narrative have specific spatial and temporal indices; they are instantiated in specific times and places. Expository prose is often generic, and generic universals require more considered examination and validation than specific instantiations;
- narrative differs from exposition along structural and conceptual lines; narrative unfolds chronologically in a causal and goal oriented way, and causal/ intentional links are important in narrative; in exposition, however, referential linkages are more important. Narrative, too, has a more vertical organisation (more embedding)
- narrative is closer to the mother tongue, and exposition closer to literate prose
- the rhetorical features of exposition are less familiar and well understood than those of narrative; often exposition has a pyramidal development, with the main point made as early as possible
- exposition evokes fewer inferences than narrative, and the conceptual organisation of narrative tends to be transmitted by

explicitly stated information. (Inferencing activity seems to be a significant factor in many of these studies.)

- narrative aims to entertain, exposition to inform
 - narrative episodes have specific spatial and temporal referents, while exposition tends towards universal spatial and temporal referents.
- Several of these factors were borne out in Neville's 1985 study: that some children fail simply because they fail to acquire and appreciate the 'language of books'; they can read the words of informative text, but they do not find and use the structure, even where it is clear and accessible, and the unfamiliar rhetorical features impede them.

Graesser also explores the differences in terms of text representations. He sees six categories of Statement Node, the basic construction unit of the schema:

- Physical State nodes e.g. the book was on the table
- Physical Event nodes e.g. the plane crashed
- Internal State nodes e.g. the patient was depressed
- Internal Event nodes e.g. the child became angry
- Goal nodes: statements that convey achieved or unachieved desired states
- Style nodes: they modify an action or event.

These nodes are related by labelled, directed arcs:

- reason
- initiate
- consequence
- manner
- property

He refers to the resulting cognitive representation as the text's conceptual graph structure. Goal oriented conceptualisations include

Reason, Manner and Initiate arcs linking Goal and Style nodes. Causally oriented conceptualisations involve Consequence arcs that inter-relate Event and State nodes. The graph structures of narrative and exposition show a number of differences:

- narrative has a higher proportion of Goal, Style, Internal state and Internal Event nodes; exposition has more Physical States;
- narrative incorporates more goal oriented conceptualisations; exposition more causally oriented and static conceptualisations;
- narrative has a higher proportion of Reason arcs, while exposition has more Consequence and Property arcs.

The differences between narrative and exposition, he concludes, are more quantitative than qualitative.

2.5.2 Text centred difficulties

Graesser (1981) also used the macro-/micro- structure distinction.

His macro-structure variables were:

- new argument nouns (given/new distinction)
- familiarity dimension
- narrativity dimension

His micro-structure variables were:

- syntax
- numbers of propositions
- letters
- words
- syllables

While the narrativity variable had the most significant effect upon reading time, it seemed to be the micro-structure variables that differentiated the slow readers. It appeared to be among the lower level

variables that the faster readers were advantaged, even while still failing often to optimise the higher level variables. Garrod's (1984) 'cascade effect' goes some way towards explaining this phenomenon in schema terms. Functional reading is geared towards the extraction of the writer's meaning, so that certain information in the text is more significant than other information. As reading proceeds, and greater knowledge of the topic is gained (a high level gain), there will be a cascade effect of processing efficiency from higher levels to lower levels: the more known of the topic, for example, the easier is the location of significant information at word level, and word identification. He demonstrated an aspect of this when he showed how subjects were quicker to detect a spelling error in an appropriate context than an inappropriate one: grasp of macro-structure improved micro-structure performance. The sub-processes of reading are not independent; instead, there is a constant interaction of sub-components whose goals are to extract information at different levels of description. For the skilled reader, the lower levels usually operate automatically in the primary mode of processing. Information is more easily packaged at this level to utilise the redundancy in its organisation, and macro-level knowledge cascades downwards to make more closed the sets of knowledge in the micro-level schemas. Thus, with this cascade effect, it is only the reader who is skilled enough to grasp at least some of the macro-structure who will benefit at the micro-structure level.

Evidently, too, the greater the proportion of primary processing, the easier the reading task (Sanford 1984). As a passage becomes more informative and difficult, it demands more secondary processing (the process of searching for more appropriate schemas). The more demanding this secondary processing, the more the reader will depend upon the

writer's skill in providing pragmatic and syntactic clues that assist search and integration.

A highly significant text-centred source of difficulty is the organisation of text material (Mandl, Stein and Trabasso 1984). Meyer (1975), using four types of discourse structure (see 2.1.2 above), hypothesised that recall would be better on adversative, covariance and response structures than on attributive structures, the last being the least distinctive structure, a simple list-like pattern. The distinctive structural schemas were expected to aid recall. She found that this was true of covariance and adversative texts, and that the structures were reflected in the recall protocols. She cited other studies suggesting that pupils could be trained quite quickly to recognise and use these top level structures.

Schnotz (1984) carried out a detailed study of the effects of two alternative 'compare/ contrast' structures, where two entities were compared with one another: firstly, object organisation, where each entity is considered separately and in full; and secondly, aspect organisation, where each aspect of the two entities is compared one at a time, so that the two entities are 'interleaved'. Object organisation implicitly invites the reader to gain an overall picture of the two entities; with aspect organisation this is expected too, but also a closer grasp of the similarities and differences is implicitly expected. This would be more demanding, and probably more appropriate where there is prior knowledge. Conversely, because aspect organisation demands more processing, recall should be better (assuming effective processing). In investigating this, Schnotz uses the helpful idea of 'learning rate': the number of propositions recalled per unit of reading time. One organisation may take longer, but still be more effective. Considering

the total reading times and recall performances, there seemed little real difference in the learning processes induced by the two organisations; but closer analysis suggested that each demanded distinctly different processing, neither qualitatively better, but each appropriate under certain circumstances. Where there is prior knowledge, for example, object organisation limits the number of switches, each switch making heavy demands on the working memory. Eysenck (1976) points out that the strength of the memory trace depends upon a number of characteristics at entry: where a trace is well discriminated from other traces, it is likely to lead to more effective long term storage, less confusion during reconstruction, and better recall. This has implications for text organisation: the context in which information is presented will be important. Schnotz's object organisation, for example, will present better discriminated traces than aspect organisation.

Clearly, then, text organisation is a significant factor, and the less organised a learning experience, the harder it is to learn from it (de Beaugrande 1984). Physical layout is often adapted to emphasise organisational features; titles and headings, for example, do much to lessen potential ambiguity, and to facilitate schema search (Sanford and Garrod 1981). But Fyfe and Mitchell (1983) warn that this may sometimes distract less competent readers; the break in linearity may cause them to miss significant information. Other well intentioned interventions, too, may have unwanted effects: comprehension of connectives increases with age; it appears to simplify text to omit some connectives, thereby reducing the syntactic complexity and lowering the apparent 'reading age'. The connectives remain implicit in the text, but will often be made explicit in the recall protocol; the reader's task has been increased, not lessened, by the apparent simplification (Pearson and Camperell 1981).

The difficulties may lie, too, in the conceptual structure of some expository prose: Anderson and Armbruster (1982) point out that many expository texts have a strict prerequisite dependency among ideas, so that concept A must be mastered before concept B can be approached. The successful reader must be able to introspect and monitor well enough to determine whether this has happened. Furthermore, with expository text, the thrust is often more towards the remembering of details than retaining gist, and retention of detail is in itself an apparently more difficult process than retention of gist.

2.5.3 Reader centred difficulties

Mulholland (1984) provided a very thorough analysis of the sources of reading failure. Although she deals with reading in general, rather than those difficulties specific to expository reading, she provides a comprehensive review of existing thinking, as well as adding the insights gained from her own work. A summary of her ideas is relevant. First, there are the factors beyond the reading process that can account for reading failure:

- socio-economic factors
- emotional/ motivational factors
- sex differences
- reasoning ability
- perceptual/ neurological factors
- interaction of the above.

Whether or not reading is seen as being made up of discrete skills, the process must be made up of components that interact

with each other; difficulties may be located within components, or within the interactions between components. The components may usefully be seen as falling into the following categories:

- visual scanning of print
- word recognition
- chunking text on the basis of local structure
- interaction between text and reader at deeper levels of processing.

The interactions are evident. For example, if the earlier stages demand too much attention, the deeper levels of interaction and processing upon which comprehension depend will be starved of cognitive resources. It is a very familiar condition. The interactions are in both directions: failure to identify important text elements may cause too much visual input to be processed, with consequent loss to the STM of concepts important to the formation of a macro-structure. Where such failure is extreme, interaction is halted, and processing becomes no more than a decoding process. Poor readers, Mulholland suggests, rely more on their own processing than on visual input. At the scanning level, words are identified as those grapheme strings bounded by spaces. Both good and poor readers tend to focus upon the first half of each constituent, but perhaps only the good readers have the well defined closed systems necessary to complete closure successfully. Not all words are focussed upon directly, though 'content' words must be recognised; there is considerable chunking. The length of segment chunked for processing will depend upon the skill of the reader - the bigger the chunk, the more effective the reader. Eye-voice span studies reveal the size of these 'thought units'; they tend to increase in size with age and ability. Successful chunking demands awareness and recognition of structure boundaries: the text markers that show the parameters of segments must be familiar. Phrase structure is a basic working unit; unfamiliar style would inhibit syntactic cues, and unfamiliar content would inhibit

semantic cues. It is unfamiliarity with the structures of written discourse that causes difficulties, not the fact that it has to be read. The problems remain even if the text is presented orally.

In addition to the chunking difficulties, Mulholland suggests that poorer readers over-utilise top down strategies; they are poor scanners, making little use of peripheral information. Long words pose fewer problems than assumed: as much difficulty arises from short words and punctuation. Further, failing readers generate fewer hypotheses. She sums up how schema theory may account for reading difficulties:

- the structures a reader deploys may vary in number, level of consciousness, accessibility, specificity, linguistic expression, and so on; variation, in effect, in their quality, appropriacy and availability;
- the reader may create or elicit inappropriate structures;
- too many structures may be utilised simultaneously;
- there may be a paucity of structures available;
- an excess of available structures;
- unwillingness to change structures;
- poor foregrounding;
- too little spare attention for processing.

All these may apply at the level of language knowledge or content knowledge.

The work of Fyfe and Mitchell (1983) provides a comprehensive analysis of sources of difficulty. Where problems arise with specialised vocabulary, further unsupported effort by the reader will be unhelpful; if the reader has not been able to gloss over the problem, direct help is necessary, and rereading is unlikely to help. Unknown words, if not successfully glossed over, make it difficult for readers to gauge the

relative importance of text elements and identify the relevant elements; they also hinder instantiation and attempts to infer appropriate examples.

Low redundancy, a common feature of many expository texts, also poses problems; there is a paucity of context clues, causing relatively more words to be processed. The minimal context support means that non-comprehension of even a small text segment may have relatively extensive consequences (Fyfe and Mitchell 1983). It may also give rise to an 'over-potency effect': difficult words in dense text may cause a reader to seize upon a familiar word, and invest in it undue importance, thus distorting comprehension.

Fyfe and Mitchell also stress the importance of an adequate level of background knowledge: the reader must bring to the text the level of knowledge assumed by the author. In schema terms, they must be using similar or parallel schemas. This common knowledge base is perhaps much rarer than we assume, and our incorrect assumptions about the pupils' starting points may account for many difficulties, and need urgent and explicit attention. Pupil frames may be sparser, and accompanying concepts less powerful, or simply different, the differences arising from the sometimes enormous cultural disparity between the world of authors and teachers, and that of their audience, the pupils. Nicholson (1984) compared pupils' 'knowledge' and experts' 'knowledge' in Maths, English, Science and Social Studies in American high school classrooms. He found grave mismatches: despite apparently purposeful learning, he described pupils' minds as a 'maze of confusion'.

These analyses are reflected elsewhere. Rumelhart (1981) suggests three sources of comprehension failure:

- the reader lacks the appropriate schema
- the reader has the appropriate schema, but the author provides insufficient text cues for this reader to activate it
- the reader finds and utilises an appropriate schema, but one that differs significantly from that utilised by the author.

Sanford and Garrod (1981) also emphasise the contractual nature of discourse; the writer and reader must share a broadly similar situational model/ scenario, from which the reader can derive his inferences. Scenario inadequacy, more than total absence of appropriate scenarios, seems a probable source of difficulty in expository prose. The more detailed the scenario elicited, the better the chances of accommodating any new input without having to maintain in explicit focus any information that cannot be matched. Information which cannot be matched will be forgotten unless it is rehearsed, or a new structure elicited which will contain it. Sanford and Garrod use the term 'hold-off' to describe the failure of both primary and secondary processing: in the absence of any appropriate scenario the reader continues to read, but it amounts to no more than the mechanical processing of a list of propositions, and their rehearsal if they are to be retained.

Fyfe and Mitchell (1983), speaking specifically of Search-Do tasks, noted four categories of difficulty source: imperfect understanding of organisation; perception problems; memory problems; and tactical difficulty in finding the entry. Mulholland (1984) refers to wider tactical and strategic difficulties: a range of studies suggests that it is harder to change hypotheses than to form them initially, particularly for less skilled readers. The narrative reader is unlikely to experience strategic or tactical difficulties, or experience the difficulties of hypothesis change: he is 'receptively' carried along by the familiar story framework (Davis and Greene 1984), while the expository reader (or

specifically, for Davis and Greene, the scientific reader) has to read 'reflectively', breaking into the flow to work upon and operate upon the input. This is hard work, and intrinsically motivating only when rewarded by understanding. Importantly, such a reader must know when to stop and reflect. This comes from knowledge of structure, perhaps often lacking.

Context familiarity is important in other ways too: instantiation of expository text often causes difficulty, demanding as it does familiarity with the probable circumstances. It needs appropriate background knowledge upon which to base the necessary inferences, and the willingness to make these inferences. Exposition often contains general statements, where a general term requires specific instantiation for full understanding: e.g. 'the container held coke' and 'the container held apples' are differently instantiated examples of the single concept word 'container'. Exposition arguably contains more such instantiation demands than narrative.

2.5.4 Reader responses to difficulties

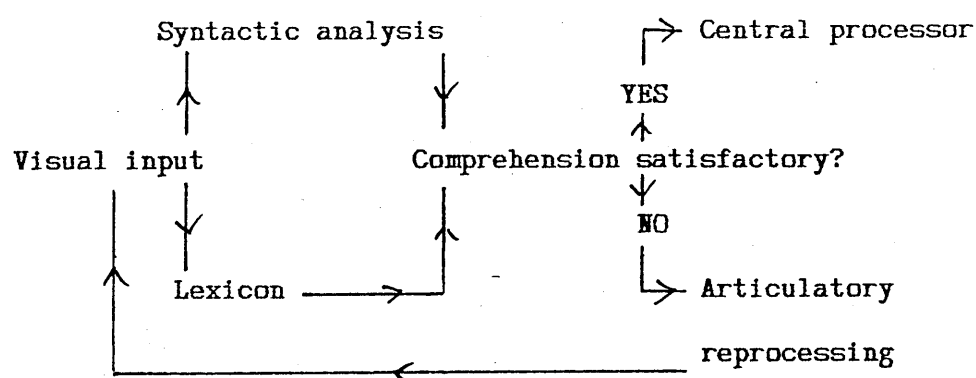
Davies and Greene (1984) offer a useful term for an all too familiar syndrome: in addition to the 'reflective' and 'receptive' reading strategies discussed above, they speak of a 'rejective' response to text, resulting from frustration. All readers will recognise this, and the spurt of ill temper that goes with it. What more positive responses may have preceded it?

One common response involves reversion to earlier, familiar, and well consolidated stages of reading. Neville and Pugh (1982) have

utilised a helpful model of how the stages of reading may be interrelated in a way that allows meaning to be monitored. Proficiency may be seen as developing through three stages:

- the oral stage, where the child recodes graphic input into phonemic patterns, thus providing an aural input, which the child recodes into speech;
- the aural stage, where larger graphic sequences are dealt with, and matched simultaneously with an aural input, for recoding into aural language if necessary to obtain meaning;
- the silent stage, where the various options are collapsed, and meaning obtained directly from text.

It does seem to describe, at least, the behaviour of children taught to read at school (though Clark's study of young fluent readers (1976) makes apparent that this sequence is not the only acceptable one). According to this developmental description, the early reader vocalises, but finds vocalisation to be an increasingly unnecessary mediation: increasingly, he 'listens in' to the text, and finally, many believe, extracts meaning directly and unmediated from the text. Where difficulty is encountered, the reader may revert to an earlier stage, aural or oral, while he searches for access to meaning. Quoting Brooks (1980) Neville and Pugh (1982) show it thus:



While most of us are aware of some articulatory processing when it involves sub-vocalisation, the role of sub-vocalisation remains controversial; for example, for Clark's early fluent readers (1976) vocalisations seemed to increase difficulty and reduce comprehension. While vocalisation seems an intuitively acceptable way of fixing and highlighting problem segments of text for closer examination, it seems counter-intuitive in that it should utilise significantly more cognitive capacity and attention at a moment when it can be ill afforded. But sometimes cognitive capacity allocations themselves seem counter-intuitive (see 2.5.1 above: Graesser 1981, Anderson and Armbruster 1982), and there seems little doubt that recourse to vocalisation is a common initial response to difficulty.

Scardemalia and Bereiter (1984) used 'thinking aloud' protocols to examine how young readers handle comprehension difficulties. They cite the ideas of Bird (1980) and Flowers, Hayes and Swart (1980) about the strategies a skilled reader uses on meeting difficulties. These are:

- to construct alternative scenarios that allow the restructuring of information into more meaningful form;
- to monitor a continuous, ongoing and automatic summary of the macro-structure;
- strategic backtracking;
- to formulate the difficulty as a problem to be solved;
- to set up 'watchers' in the reader's mind for the information needed to solve the problem (e.g. definitions needed to explain unfamiliar words, etc.).

The ideas of Anderson (1980) are broadly similar, and more detailed. When the reader is aware of comprehension failure, one or more of the following will be invoked:

- may take immediate strategic action, or store the problem in memory as a pending question;
- if store as a pending question, may store it with a tentative hypothesis about the answer;
- if forms a pending question, usually continues to read;
- if forms too many pending questions, or too many repetitions of the same one, reader may take strategic action;
- if takes strategic action, may
 - a) reread
 - b) jump ahead
 - c) consult outside source
 - d) make written record of pending question
 - e) think/ reflect about pending question
 - f) quit reading the text
- if strategic action successful, reader continues reading from the difficulty point;
- if not successful, alternative strategic action usually chosen.

2.5.5 Limitations of existing theory

Schema theory has been put forward as a potent and convincing explanation of the reading process. It is an incomplete explanation. Barr (1982) feels that the term 'schema' is used so broadly, at so many levels, and encompassing so many inter-relationships, that it loses all precise meaning. Kintsch (1982) feels that the research emphasis has been wrong, and that distinctions, for example, between text types are unhelpful, because many informative texts do not have fixed structural schemas in the way that stories do. What is needed is an explicit extension of our model of the processes of comprehension, focusing upon

what the reader does when comprehending. He states: 'In sum, I believe that schema theory in its current form is not directly relevant to the practice of teachers in guiding the expository reading of their students. At the same time, on a general level, the theory may be of considerable value....' (Kintsch 1982, p.82). Graesser (1981) was perhaps reaching for just such an explicit extension of the comprehension model when he considered the reasons for college students showing such dramatically poor understanding of simple scientific mechanisms. He precluded variations in surface text features as causal factors in varying the ease with which different genres may be read, and speculated that the expert comprehended scientific mechanisms on the basis of multiple models, each one capturing a different aspect of the mechanism, while the average comprehender sought a simpler explanation of causally driven phenomena, with event A leading to event B leading to C, and so on.

Schallert (1982) identifies two separate strands to the process of learning from text:

- the changing of existing knowledge structures as a result of reading;
- the development of facility with different prose types.

Both strain the limits of schema theory in the same way: how are existing schemas developed, and, more significantly, how are new ones constructed? Schallert's latter development, in schema terms, amounts to the acquisition of appropriate language domain schemas at all levels of language use, from macro-structures downwards. Her former strand refers, ostensibly, to operations on existing structures, rather than the acquisition of new structures; but the borders may be hazy. Nothing will be built entirely from scratch, and the point at which a developing schema ceases to be a development of an earlier structure, and should

more properly be regarded as a new structure, seems elusive. Reading involves coherence building, linking new information to existing structures, and forming new links. It involves instantiating existing schemas, and, through successive instantiations, developing and enriching the schemata. Piaget's notion of assimilation equates to schema instantiation, and his accommodation to schema development (Otto and White 1982). Research emphasis has been upon schema use, not schema growth and change (Schallert 1982). However, it is growth and change that is the purpose of expository text, and we understand it only imperfectly.

Spiro et al (1987) outline a perspective that seems potentially promising. All recent theories of comprehension, problem solving and decision making stress that success in all such cognitive areas depends upon the activation and application of pre-existing knowledge structures; but, they point out, very little is known about how this can be applied to new situations, where we do not have such pre-existing, ready-formulated structures. Schema theory is useful and applicable where our knowledge domains are routinised and well packaged - but usually they are not. The attempt by Spiro and his colleagues to take schema theory the next necessary step onwards depends upon a distinction, between well structured domains (WSD) and ill structured domains (ISD). Their concern is what one does "when relevant prior knowledge is not already organised to fit a situation ... and so must be assembled from different knowledge sources in memory?" (p.177). They contend that:

- research has focussed on WSDs, not ISDs; it is characterised by tending towards the compartmentalised, pre-packaged, regularised, and 'artificially neatened'. They suggest that this stage was a necessary simplification in the understanding of a new field, but

that there is a 'conspiracy of convenience' by educators to preserve this: it suits teachers, learners and test givers to organise and simplify knowledge, to focus upon rules, principles and generalities;

- that the two need very different, sometimes opposite, conditions for learning and instruction
- that while WSDs allow transfer from one situation to another, ISDs do not do so in the same way. This they regard as one of the most serious problems arising from treating ISDs as if they were WSDs;
- transfer in ISDs depends upon multiple connections/ pathways between items of domain knowledge, between examples, or 'cases';
- most cognitive encounters are distinguished by their naturally occurring complexities and irregularities, rather than by the predictable organisations implied by existing schema theory
- for ISDs, 'emphasis must shift from retrieval of a precompiled schema to the assembly of a situation-sensitive schema from knowledge fragments' (p.178)
- this kind of cognitive flexibility depends, to use their own metaphor, upon treating a content domain as a landscape that is explored by criss-crossing it in many different directions, thus re-encountering the significant items of domain knowledge, the cases, the sites in the landscape metaphor, in numerous different but related contexts.

This viewpoint has implications for learning from reading: what they call 'case based learning' would involve more time and effort in initial instruction in a domain: ways must be found to allow the reader/ learner to traverse the landscape repeatedly, and re-encounter the cases again and again, in a range of contexts. That way the connections will be formed, and the knowledge will be gained in a way that allows for transfer. More importantly, for expository reading, each such 'landscape

encounter' would presumably encourage and strengthen the reader's willingness and ability to traverse a cognitive landscape in this way, to find, take note of, and make use of these important pathways.

It seems a plausible potential direction. But at present it seems no more than that. Resnick (1984) puts bluntly a concern reflected by others (Otto and White 1982, Schallert 1982, Barr 1982, Kintsch 1982): 'Beyond a shared recognition of the importance of schema construction in learning, we have virtual theoretical silence.... The problem of acquisition of new schemata.... is surely one of the most important current challenges for a cognitive theory of learning.' (pp. 438/9).

CHAPTER 3: EXPERIMENTAL APPROACHES

In Chapter 2, a number of theories of reading, and learning from reading, were considered. In general, these theoretical viewpoints tended to converge: in the theoretical framework that emerged, skilled reading was seen as involving multiple interactions, between the text and myriad packages of reader knowledge and experience. At any one time, many such packages will be involved, as whole packages or as fragments; the packages might be complete or incomplete; certainly they will draw from all the hierarchical levels of the reading process, and will interact simultaneously with one another as well as with the text. Through this ongoing and complex interaction, the reader constructs his or her understanding of what has been read.

Such a theoretical framework offers one way of understanding the processes of reading, and the possible difficulties involved in learning from text. The aim of this project was to probe these difficulties experimentally, thereby to increase our understanding of them.

This theoretical framework was taken as the starting point - from it, ten sources of potential difficulty were identified for experimental investigation. Stated very simply, the experiments involved comparing the performance of readers in the presence and absence of each difficulty. This meant preparing appropriate texts, where the difficulty was or was not prominent, and comparing readers' effectiveness across these two conditions.

3.1 The Sources of Difficulty

Each study focussed upon one or more sources of potential difficulty. Each of the target difficulties had been investigated before; the attempt here was not necessarily to confirm or question earlier findings about the importance or existence of these sources of difficulty, but to examine a wide range of them in similar experimental conditions, and to make some tentative comparisons between them. The potential difficulties being probed are shown in Table 1, with outlines of the accompanying hypotheses:

TABLE 1 The targeted text features

STUDY	SOURCES OF DIFFICULTY	OUTLINE HYPOTHESES
One	Motivational effect of genre	A reader develops a mental set towards narrativity
	Sex difference	This set is more pronounced among girls
Two	Proportion of given/new information	Texts with higher proportions of new information present greater difficulty
Three	Lack of cohesive explicitness and 'signal' words	Implicit cohesion is more difficult than explicit

STUDY	SOURCES OF DIFFICULTY	OUTLINE HYPOTHESES
Four	Level of inferencing	A high level of simple inferencing facilitates reading
Five	Lack of familiar structure	Unfamiliar structures impede reading
Six	Instantiation	Heavy instantiation demands impede reading
Seven	Deductive/ inductive text and paragraph organisation	Early statement of main points improves reading
Eight	Causal chain characteristics	Readability is related to the proportion of events on the main causal chain, with events on the chain being more easily recalled
Nine	Lack of topic concreteness/ imageability	Imageable/ concrete topics can be more more read
Ten	Making explicit the differences between essential and non-essential information	Texts which make explicit which information is of central importance are more easily read.

3.2 General Approach

There were two stages to the experimental programme. The first stage studies, ten in number, formed the bulk of the experimental programme. They are reported in Chapter 4. A summary of the significant findings from these studies (see Chapter 5, Section 5.1) provided the basis for the second stage of the experimental programme. This comprised a single study, using a larger experimental population and fresh design and materials to re-examine those features of expository reading that the first stage results had suggested might be significant.

The first stage, then, took the form of ten separate studies, one for each of the ten sources of potential difficulty. Each study aimed to develop and explore experimental materials that might illuminate reader difficulty in that area. Each study was developed in three main stages:

- (i) development of reading and test material appropriate to that source of difficulty
- (ii) administration of the material in an experimental setting, using opportunity samples in the 11 to 12 year age range
- (iii) statistical analysis and discussion of the resulting data.

For some of the studies, particularly the earlier ones, there was considerable preliminary piloting of the materials, and subsequent redesign, before use in a full experimental setting.

The studies were as far as possible uniform in their approach, to maximise opportunity for inter-study comparisons. In each study, a text was developed in which the target difficulty was not prominent - for example, in Study 5 (see 4.5 and App.5), which probed the effect of familiar text structures, a text was prepared that followed a normal narrative structure. This was a Low Difficulty text. The same text was

then adapted to make the target difficulty prominent; in the Study 5 example, exactly the same account was given, but the structure was altered to a much less familiar one. This was the High Difficulty text. The same test was then prepared for use with both the High and Low Difficulty versions: they were, to all intents and purposes, the same passage, differing only in one major respect, the manipulated variable. In the case of the example study, Study 5, the text structure was the manipulated variable.

This would allow an unrelated/ random experimental design: the same reader could not be tested on both passages, as they were identical in content, and similar in all major respects bar the target difficulty. There was, too, the same test for the passages. So using just two texts, one High and one Low difficulty version, two experimental groups would be needed, one to read the Low difficulty version, and the other the High. The same reader could not read a Low and a High difficulty version. The test scores would then be analysed using unrelated/ random statistical tests.

To extend this to allow a related/ fixed design, a second topic was developed, to give two further texts, one High and one Low difficulty. The texts from the two topics were generated to be as near identical as was possible, allowing for the different topic. This involved using a common template in constructing texts for the two topics, and retaining as far as possible all the critical features (see 3.3 for text matching), while changing only the topic. This way each reader could be tested on both a High difficulty and a Low difficulty text, for example the High difficulty version of the first topic, and the Low difficulty version of the second. There were, then, four texts in each study:

Topic A, High difficulty

Topic A, Low difficulty

Topic B, High difficulty

Topic B, Low difficulty.

This allowed each reader to be tested on a High difficulty and a Low difficulty text, using matched texts across two different topics. The reader's performance when faced with a certain difficulty could be studied, and compared with performance in the absence of that difficulty. Given a difference in performance, whether or not in the expected direction, the data could then be analysed, and considered for inclusion in the second experimental stage of the project.

Texts sought to be simple, but fairly typical of school texts, in length and style. Clearly, texts cannot be matched in any experimentally 'watertight' way - there are too many variables about which too little is known. But laboratory perfection was not being sought, and hypothesis confirmation/ rejection was not the sole aim of each study: taken together, the studies were intended to provide the first step towards an ecologically valid means of exploring and comparing the reactions of readers to a range of distinctively different texts, and to allow a tentative comparison of some of the difficulties involved in reading expository text. The outcome, and the value of such research approaches, is discussed in conclusion.

3.3 Matching the Texts

The extent to which equivalence between texts can be achieved is clearly limited: not enough is known about the reading process even to

list fully the possible variables involved, let alone match them across texts with complete confidence.

Yet the extent to which texts are matched is a critical yardstick in considering differences in reader performance when reading different texts. Text variables across the experimental texts must be matched as well as can be, albeit imperfectly, to allow any insight at all into the effect of the manipulated variable. Given that insight, later text construction becomes that little bit more precise. As always, researchers have to fall back upon the best approximation that can be achieved, in the hope that their research may result in a better approximation.

A number of variables were considered, some amenable to objective quantification and control, others obdurately, or intrinsically, subjective, given our present state of knowledge. They are listed below:

VARIABLE	DESCRIPTION
passage length	the length of the passage, measured in the number of words
sentence length	the length of the sentences, measured in numbers of words
sentence numbers	the number of sentences per passage
text structure	the order of the main elements of the passage

text/ para organisation	the position of the central ideas in relation to supporting detail
given/ new	the proportion of given information to new
'signal' words	explicitness of cohesive devices and 'signal words
inferencing	level of propositional inferencing demanded of the reader for the passage to read easily
instantiation	degree to which the passage demands a high level of instantiation on the part of the reader
causal chain	the causal chain characteristics of the passage
concreteness	the extent to which the topic is concrete/ imageable
importance ranking	the signalling to the reader of the relative importance of the elements of the text
lexical familiarity	the probable familiarity of the words used in the passages
topic familiarity	the extent to which the passage topics are likely to be familiar to the experimental population
curriculum area	the curriculum area in which such a passage might be encountered in secondary school

Some of these provided the independent variables that were deliberately manipulated in the studies; others remained simply variables that had to be considered, and controlled for as far as possible.

The manner in which text equivalence was sought in each study is discussed more thoroughly in the report of each study, and an attempt is made in each case to suggest the degree to which matching has been successful, at the levels of 'Hi/ Lo', 'Topic' and 'Study' (see below). The means by which the match was evaluated for each study is explained overleaf. Clearly, while some measures may be objective, others have to rely upon some measure of subjective judgement.

VARIABLE	MEANS OF EVALUATING MATCH
passage length	by count
sentence length	by count
sentence numbers	by count
text structure	by inspection, comparison, and comment
text/ para organisation	by inspection, comparison, and comment
given/ new	by judgement about what constitutes 'Given' or 'New' information, followed by count
'signal' words	by count
inferencing	by a modified propositional analysis of several samples from each text (Cohen 1978), and subsequent comparison of the inferencing demands made upon the reader
instantiation	by inspection, comparison, and comment

causal chain	by causal chain characteristic analysis of several samples from each text (Trabasso et al 1984), and subsequent count of 'dead end' events
concreteness	by inspection, comparison, and comment
importance ranking	by inspection, comparison, and comment
lexical familiarity	by judgement of teachers experienced in the appropriate subject area and age group
topic familiarity	by judgement of teachers experienced in the appropriate subject area and age group
curriculum area	by judgement of teachers experienced in the appropriate subject area and age group

Matching the texts in these studies had to be considered at three levels:

Firstly, 'Hi/ Lo matching', the matching between the high and low difficulty versions of the same topic in each study. This was generally easiest to achieve, as the two versions were usually nearly identical, being changed with respect to a single variable only, such as the presence of 'signal' words, or the sequence in which the paragraphs were presented. Because of this relatively close matching, those experimental results that draw only upon scores from high and low difficulty versions of the same topic, by using different readers, can be regarded as deriving from well matched texts (see 3.3 above, the discussion of the unrelated/ random design).

Secondly, 'Topic matching', the matching between the two different topics within the one study. This seemed a generally close match, with both topics being generated from the same 'template', and by the same writer. As the validity of the projects results can be judged only by assessing the validity of the text and test materials, these templates

merit further explanation. They were, in effect, detailed structural blueprints, controlling, as far as possible, the construction of each passage at every level, ranging from numbers of words and sentences to the conceptual nature of the different text elements, and their inter-relationships. An example of a template is shown overleaf, drawn from Study Five. Each passage had six text elements (shown in capitals), with the content of each element specified in the right hand column. Passages were then built up step by step from this common template, matching all of the features discussed above, as discussed above. In the case of Study Five, the two topics were imaginary accounts of the development of the wheel, and the development of a new kind of boat.

Structural template for Study Five:

SETTING	weather and landscape; deadline; workers; mechanics of task.
HERO	appearance; position/ status
PROBLEM ARISES	its nature; its implications
PROBLEM TACKLED	idea dawns/ source of idea; works out how it might be done; decides to try it
PROBLEM SOLVED	new apparatus seen working
HAPPILY EVER AFTER	flash forward: problem now a thing of the past.

As can be seen, at the more mechanical and objective levels, such as sentence length or passage length, matching would usually be identical. (There were exceptions, depending upon the nature of the manipulated variable: in Study Five, for example, where passage structure was the manipulated variable, the changing of the order of the text elements in the High Difficulty version necessitated some small changes to the phrases linking the text elements, thus altering the word

count a little.) At other levels, judgements had to be more subjective, but overall, the use of such a common structural template in constructing texts for the two topics ensured a relatively close match. Accordingly, those experimental results that draw upon scores for the same reader across high and low difficulty texts using two topics should still be regarded as deriving from relatively well matched texts, although less so than where only one topic was used, with different readers (see 3.3 above, the discussion of the related/ fixed design).

Thirdly, 'Study matching', the matching of texts used across the different studies. This governed the extent to which inter-study comparisons might be valid. Generally, it was much more loose and subjective than 'Hi/ Lo' or 'Topic' matching. Comparisons between the studies, then, should be treated with caution. Although they offer an important contribution to the whole project, they are not experimentally objective, and the basis of such comparisons are more qualitative than the intra-study findings.

3.4 Assessing Pupils' Reading

No single method of assessing reading effectiveness presents itself as being obviously optimal for all the wide range of text features being explored in these studies. Nor are any of the established techniques of assessing cognitive activity fully valid, or reliable. The assessment philosophy here, then, is necessarily and deliberately eclectic: depending upon the nature of the passages in each study, and the aspect of reading being probed, assessment techniques were chosen for their apparent appropriacy; they were developed, and adapted as necessary after pilot trials. Often this led to sections of tests being altered or

abandoned, sometimes with alternative sections being developed and piloted to replace them. (The experimental designs, as well as practical considerations, demanded that the assessment tasks be paper and pencil tasks for whole groups; such potentially valuable and subtle approaches as interviews and recall protocols had to be excluded.)

Initial choice of assessment approach, then, was based on the particular demands of each study. Assessment material was tested during pilot trials, and retained after pilot trials if it discriminated effectively between pupils. Poor discrimination between pupils was the most common reason for material being discarded or adapted. Sections were occasionally discarded for other reasons: perhaps it became apparent that one section interfered with another, by providing answers; or that a number of pupils gave deviant responses, without apparent internal consistency, and in conflict with their performance in the other sections of the same test; or that scoring the responses proved unacceptably ambiguous or subjective. No material was discarded on the grounds of it having provided unexpected or counter-intuitive results. Indeed, such results were welcomed.

What governed choice of approach? Comprehension is being defined here as a model building process: the reader uses cues provided by the author to initiate inferencing, at all levels of understanding, so that a model of the author's meaning is constructed. The inferencing depends upon, and draws upon, the reader's prior knowledge, again at all levels: where well-developed schemas exist, a detailed model may be rapidly constructed, and comprehension reduced to slot filling and verifying. Inferencing under such circumstances amounts to no more than accessing the schema's default values. It is Sanford and Garrod's 'primary processing' (1981), where the reader may store whole chunks of data in a

single operation simply by pointing to an appropriate schema. Reader and author interact, via the text, on the basis of shared conventions, and on a network of tacit assumptions about each other's understandings, experiences and intentions. No two readers, however, come to the text with identical experiences and intentions. Thus no two acts of comprehension will be the same; the writer of the passage cannot predict exactly how each of his readers will comprehend - more importantly, in this context, neither can the assessor. The assessor must be aware of this inevitable spread of understandings and interpretations; he must be aware that he can at best seek to identify probable common ground as a basis for his testing.

Johnstone (1983) suggests that text is only comprehended when a reader has stored the ideas contained in it, established the logical connections between these ideas, and is able to 'express them in an alternate form'. This last, very demanding criterion seems intuitively valid, but presents the assessor with a paradox: unless the reader has a 'photographic' memory for full comprehension, it seems certain that the original surface structures must have been transformed prior to storage, probably into some sort of macropropositional summary of the gist; but this gist summary may not, probably will not, have been formally organised by the reader, expressed to himself in a finalised language form. More probably, it has been stored in some partly verbal form, a conceptual network using a partly languaged 'shorthand' of a kind that does not utilise fully the formal structures of uttered language (Britton et al 1970, Spencer 1983, Weedon 1982). To ask a reader to present this to the assessor in a formal test situation, to make it explicit by crystallising it into written language, may impose a critical further demand. Production skills are unlikely to correlate perfectly with comprehension skills (Neville 1985).

There are, then, impediments to the accurate assessments of the products of comprehension; they remain, as yet, unavoidable. In light of them, it might be more appropriate to focus upon and assess the processes of comprehension, rather than the products; but such measures do not lend themselves to group testing, nor to paper and pencil measures, and are thus not available as options in this study. While cloze procedure is often considered as a measure of process, in the context of the experimental designs used here it would not be: in these studies, the passage is read, and then removed prior to assessment. Comprehension, then, is only available for scrutiny in an indirect, second hand way, a way that is far from perfect. Because the assessor must infer about comprehension by using other sources of data, he must examine as thoughtfully as possible the grounds and assumptions upon which such inferences are based. Classical measurement theory suggests that if a tester administers a random sample of questions, drawn from the infinite number of questions that could be generated (Johnston 1983), he will gain valid information. Johnston doubts this, and suggests that rule governed, systematic methods of item generation would be more appropriate: the tester must be clear about exactly which information and relationships he is probing, and what cognitive demands are involved in the successful completion of the test. He must be aware of other factors too: for example, that skilled processing focusses upon information on or near the causal chain, and, if attributive information rather than causal information is probed in assessments, the processes of storage or retrieval involved will not necessarily have been the same, or as central to effective comprehension. Careful consideration of all such factors must precede choice of assessment technique; equally, it must inform the ways in which results are interpreted.

Comprehension testing that focusses upon the products of comprehension cannot be divorced from memory. To some extent, though, the two phenomena will be correlated: a comprehended message will be better retained in memory than an uncomprehended message; indeed, better memory will to some extent be an accidental by-product of fully understanding a text, something put to use when delayed recall is used as a measure. For the purpose of this discussion, comprehended input is seen as being stored in a long term, schematically organised memory, while the term 'working memory' is used to describe the limited capacity, short term space where propositions are held while being operated upon. Obviously, assessment with *text absent*, as in these studies, places significant demands upon storage in long term memory, and emphasises some cognitive demands more than others; cueing, organisational and retrieval skills are critical, while such reading skills as scanning and physical search figure not at all.

The area is a minefield of interacting difficulties. Question formats that provide obvious cues may tap more stored information than would formats with with fewer cues; but by doing this they may stimulate further processing. A poor reader may thus make an inference he would not normally have made, so that the original act of reading is no longer what is being assessed. Also, the extent to which the original surface structure is present in the question may be important: some readers may rely more than others on features of the surface structure for both storage and retrieval. The degree to which the text interests the reader seems, for some children, to have considerable effect on test performance (Lahey, McNeese and Brown 1973). The extent of the reader's background knowledge of the topic will be obviously important. Impulsiveness would be an obvious problem when responding to multiple choice items The list of problems could continue almost

indefinitely. Certain techniques may favour certain readers, however much care is taken over test selection and construction.

In these studies, however, the problem may be less critical than it might be elsewhere. Most of the weaknesses discussed above refer to comparisons between the performances of different readers on the same test; in the studies that follow, the performances of one reader are usually being compared in two parallel tests, two tests of similar structure and design, though of different content (see 3.3 below). The warnings above are still important, in that a myriad of factors may become between the assessor and the reader's true understanding, so that 'pure' comprehension is not being measured; but, in each study, largely the same factors will affect each reader in both the tests he performs. Thus it is hoped that the reader's performance is being compared fairly reliably under the two sets of circumstances; the problem lies with the validity, in that the assessor can never be certain of the extent to which he is measuring what he wishes to measure, the reader's comprehension of the text.

What techniques were considered, and what were the constraints and demands imposed by each? While different assessment techniques place different cognitive demands upon the successful respondent, some are common to all techniques: for example, the test passage must be decoded and comprehended, as must be the test item. Similarly, the passage content must have been stored, in some form, in the long term memory. Other cognitive demands may vary from one assessment technique to another. Examples of such demands are listed and explained below:

Production: the productive skills needed to organise and synthesise ideas and content into a written response.

Search/ retrieval: the processes of finding, accessing and retrieving the stored material; present in all assessment items, but most prominent where the test item lacks obvious cues, e.g. free recall.

Working memory: the limited space available for holding propositions in explicit dynamic focus while operating on them, e.g. multiple choice with confidence ratings, where all the options and the stored content must be scrutinised simultaneously; or summary, which involves groups of propositions being brought forward at the same time for selection and arrangement.

Matching meanings: the kind of search and identification procedures involved in recognition based items, where a stored unit of information is sought to match a unit of information presented in the test item, e.g. true/ false identification, closed cloze, etc.

Application: the application of a stored idea to a new context, e.g. summarising for the benefit of another, where the stored and recalled material has to be selected and reorganised according to new criteria.

Examiner expectations: items where the examinee has to predict some aspect of the examiner's expectations. Applies to most items that are not closed choice.

Global comprehension: where something more than local comprehension is required, a grasp of inter-relationships across larger sections of the text, and the text's macrostructures

Non-verbal aptitudes: where a non-verbal element plays a part in successful response to the item, e.g. diagram recognition and diagram completion.

The cognitive demands that might be made by the different assessment techniques available for use in a project such as this are shown at Appendix 11. All the techniques are envisaged as being used in a 'text absent' context. Any of the techniques could be used immediately after reading, or after a delay. When delayed, the demands upon storage and memory are obviously significantly increased. Test items avoid the surface structures of the text as far as possible, so that transformation of meaning into different structures remains an ongoing demand in all of the techniques. The cloze techniques listed do not involve 'arithmetic' deletions; they focus systematically upon specific ideas, text features, or word categories.

As can be seen from Appendix 11, many techniques in frequent use make only limited cognitive demands. It is not the case that the greater the demand, the more valuable the assessment technique; it simply means that the results must be considered in light of the demands made. For example, categorisation of statements as 'True/ False/ Not Enough Evidence' works mainly to find out whether certain propositions were placed in storage during initial reading; unless designed specifically to do so, such a test will not probe grasp of inter-relationships, or test whether the propositions were stored in a methodical and accessible manner, since search and retrieval are generously facilitated by the structure of the assessment item. If, too, the content of the statements includes propositions located off the main causal chain (as is often the case in statement verification), then it is not gist storage that is being assessed, but something else, something perhaps less significant

in terms of effective reading. Ideally, then, techniques should be selected that suit simultaneously the targeted variable in the study, the nature of the text, and the cognitions that seem most relevant. Hence the eclecticism. It may, too, sometimes be helpful to combine techniques: to select 'true' statements, then rank them according to some criterion, and then perhaps summarise them would be a very demanding task; it would be, cognitively, a most wide-ranging one. Such combinations would need to be used with caution, however, because of their hierarchical nature: failure at an early stage might mask an ability at a later stage. It would certainly be difficult to score and interpret.

Valid interpretation remains perhaps the most difficult task of the assessor. There are so many complicating factors. Motivation is an obvious one: Johnston (1983) quotes a paper from Harste and Burke reporting findings that when pupils gave free recalls in test situations, they were far less comprehensive than recalls given to a friend who had not read the book. Chance can play a large part in many techniques. Also, the extent to which these different cognitive demands are independent of each other is not known. Certainly, there will not be perfect correlation between any two; but it seems equally probable that there exists to some extent a 'general' factor among the skills involved in reading, so that success in one area has some predictive value for success in another. What might be the interaction between the demands made, and how might it affect success? The imponderables remain significant, and even with the greatest care, measurement will remain primitive and inaccurate.

CHAPTER 4: STAGE ONE OF THE EXPERIMENTAL STUDIES

4.1 Study One:

Focus: The motivational effects of genre, and whether this differs for boys and girls.

Theoretical context: That pupils seem more competent with narrative than exposition is well documented (see Chapter 2). There may be many reasons for this; a prominent one would probably be that narrative contains its own rewards. The rewards contained in other types of reading might be less apparent to the school pupil. This, it was felt, could induce a 'set' towards stories, a heightened mode of functioning, where the reader committed himself (or, more likely, herself) more fully to the reading process simply because he or she is expecting to enjoy it. Putting it another way, the reader involved in narrative might be functioning in a generally more effective way simply because it is narrative being read. Equally, narrative may be dealt with more effectively because its structures and forms are more likely to be familiar to the reader. The idea is then taken a little further: if, as seems possible, girls read more in the early years, mainly narrative reading, and are more competent narrative readers than their male peers (Neville 1985), then this set towards narrativity might be more marked among girls than boys. The hypotheses in this study, then, are based on this idea: that stories are familiar and rewarding, in a way that reading for learning is not; and that this will be reflected in a raised level of processing when narrative is being read.

4.1.1 Hypotheses:

1. That there exists a 'set towards narrativity', so that a reader will process a group of concepts more effectively if it is encountered in a narrative context than if it is encountered in an expository context.
2. That this set towards narrativity will be more marked among girls than boys.

4.1.2 Methods

To test these hypotheses, an expository core was embedded into two contexts, a narrative context and an expository context, so that an identical factual passage (the expository core) appeared on the one hand in a story, on the other in a factual passage. This identical expository core could then be tested, to see if it was processed more effectively when encountered in a narrative context or an expository context. To allow a mixed design, two core sections of expository text were prepared, each then being embedded into two different contexts, making four passages in all. In this way, the same reader could encounter both a narrative and an expository passage. Both core sections dealt with simple mechanisms, and their operation: one, a foxtrap; two, a castle drawbridge. In each case, understanding of the mechanism was necessary to understanding of the passage.

As 'natural' reading, under 'normal' circumstances, was being sought, the passages were relatively long (c. 1000 words). In this way, it was hoped, the expository core sections would not appear prominent or

dominant, but would dovetail unobtrusively into the rhythm and structures of the passages. For the same reasons, the texts were removed after reading, and pupils were not allowed access to them while doing the tests; nor were they warned that only one small section of the passage was to be tested. The concern was with the representation stored during a single, normal reading.

4.1.3 Materials

There were four experimental texts, revised and refined repeatedly through a sequence of formal and informal pilot trials.

A: 'Frontier! Life in a Border Castle 400 Years Ago'

(Drawbridge mechanism, set into exposition)

B: 'The Tukes: a Trapping Tribe in the Far North'

(Foxtrap mechanism, set into exposition)

C: 'The Carry Out'

(Foxtrap mechanism, set into narrative)

D: 'Escape at Midnight'

(Drawbridge mechanism, set into narrative)

(See Appendix 1)

Early trials included very young children (5 to 8 year olds) to ensure that the expository core sections were not conceptually too demanding. Text matching in this study did not follow exactly the patterns in subsequent studies, as the difference between High Difficulty and Low Difficulty versions was defined by the contexts into which the target expository core sections were embedded, rather than a single source of difficulty being more or less prominent. The contexts

into which the target expository cores were inserted were matched as follows:

Variable, and Degree of Matching

passage length	identical
sentence length	identical
sentence numbers	identical
text structure	in both narrative contexts, perspective shifted between the two main protagonists with each paragraph shift; in the expository contexts, both dealt with similar aspects of life in hypothetical communities
text/ para organisation	similar in the narrative contexts, introducing main characters before setting the scene, developing the plot, and finally resolving the difficulty to the advantage of one of the protagonists. In the expository contexts, the actors were introduced, and their landscape and domestic arrangements; then, after the target sections, the account of the mechanism failure, and reasons for it. Both finished with surmise about the future.
given/ new	similar within the narrative and expository contexts; less similar across them.
'signal' words	relatively low level of explicit causal or temporal connectives in all the contexts
inferencing	all the passages made relatively high demands upon inferencing, particularly in the way the narrative shifted from protagonist to protagonist with each

	paragraph change, demanding that the reader make for himself the links between the two converging strands in each
instantiation	explicit in all contexts, with few instantiation demands
causal chain	some dead end events in both narrative contexts, usually concerned with descriptive detail and evocation of scene and atmosphere. In both expository contexts, very few events lay off the causal chains of each causal field
concreteness	all contexts highly concrete
importance ranking	relatively explicit in all the contexts
lexical familiarity	similar
topic familiarity	each context was chosen for the relative familiarity of its type and genre, if not for the content specifically
curriculum area	both expository contexts drew upon the Social Subjects (History/Geography/Modern Studies)

The expository cores themselves, those targeted parts of the text that were assessed, were matched as follows:

Variable, and Degree of Matching

passage length	identical
sentence length	identical
sentence number	identical
text structure	in both, a description of materials, structure, then operating mechanism
text/ para organisation	similar
given/ new	similar

'signal' words	the level of explicit causal and temporal connectives in both sections was very low, with two incidences in one section, and three in the other
inferencing	deliberately low inferencing demands in each section: great care was taken to make explicit as many propositions as possible
instantiation	low demand in both passages, again for reasons of optimum clarity and unambiguity
causal chain	no dead-end events in either section
concreteness	both sections deliberately highly concrete and imageable
importance ranking	similar: in both descriptions, each proposition was of similar importance, each being a necessary link in the chain of understanding
lexical familiarity	similar
topic familiarity	similar, in that neither mechanism existed, so no pupil could have specific prior knowledge of one or another; both were created for the purpose of the experiment, and both drew on simple, everyday ideas and objects.
curriculum area	both drew upon the Social Subjects

In general, the match seemed a close one, between the expository core sections, and between the contexts in which they were embedded.

At the inter-study level, close comparison was not relevant. This was, to a large extent, a 'one-off' study, setting the scene for the subsequent sequence of studies, rather than forming part of that sequence. However, the expository passages were in the appropriate curriculum area, and both expositions and narratives seemed fairly 'typical' of school reading for that age group. Piloting the core sections alone, before embedding them into their appropriate contexts, bore out the impression that the drawbridge core, while well within the grasp of the trial population, was harder than the foxtrap core. Using a one-tailed 't' test, the pilot trial difference in the mean scores on

the core sections alone was significant at the 5% level. This difference was countered by alternating the presentation of texts (see 4.1.5 below). Pilot trial results indicated no sex bias in the topics of the expository core sections.

As only expository core material was being tested, only two test instruments were needed for the four texts, one for the Drawbridge, the other for the Foxtrap.

Each test contained three parts, as follows:

- Part 1 Recognition of the correct mechanism among drawings of ten possible mechanisms
- Part 2 cloze exercise
- Part 3 multiple choice questions.

(See Appendix 1 for tests, answer forms and marking instructions)

4.1.4 Subjects

Full pilot trials of the experimental texts and tests were carried out on pupils of average and below average ability at Secondary 1,2, and 3 (ages 12, 13 and 14). It was found that the tasks discriminated inadequately at this level, and were insufficiently demanding. Accordingly, an experimental population at upper Primary level was chosen, using 68 children of normal ability range, aged 10 - 12.

4.1.5 Administration

The texts and tests were administered to three upper Primary classes. The purpose of the experiment was explained briefly to the pupils, though not in such detail as to compromise the test material (see sample Administration Instructions at Appendix 12). It was felt that a reading task with no stated purpose would not provide realistic experimental conditions, and the true purpose seemed as appropriate as an invented; and, among school pupils accustomed to the curious demands of teachers, perfectly adequate.

The pupils' answers were entered on a prepared form (see App. 1)

Text allocation was alternated, to ensure a balanced exposure to the four texts.

4.1.6 Results

Six analyses of variance were carried out on the data.

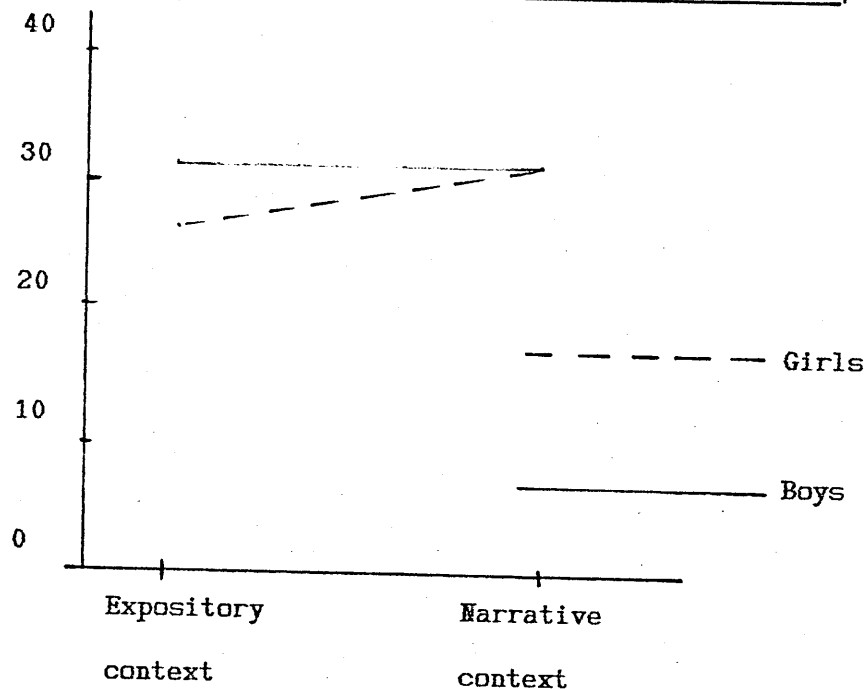
Initially, to test Hypotheses 1 and 2, total scores were analysed for the effects of:

- Variable A: sex of reader
- Variable B: narrativity of the context in which the expository core was embedded (narrative? expository)
- Interaction between variables A and B (between sex and context narrativity)

TABLE 1: Mean Scores (Total Scores), by sex

N=68

		Variable B: Narrativity of Context	
		B1 Narrative	B2 Expository
Variable A	A1 Girls	29.5	27.6
	A2 Boys	29.7	31.2



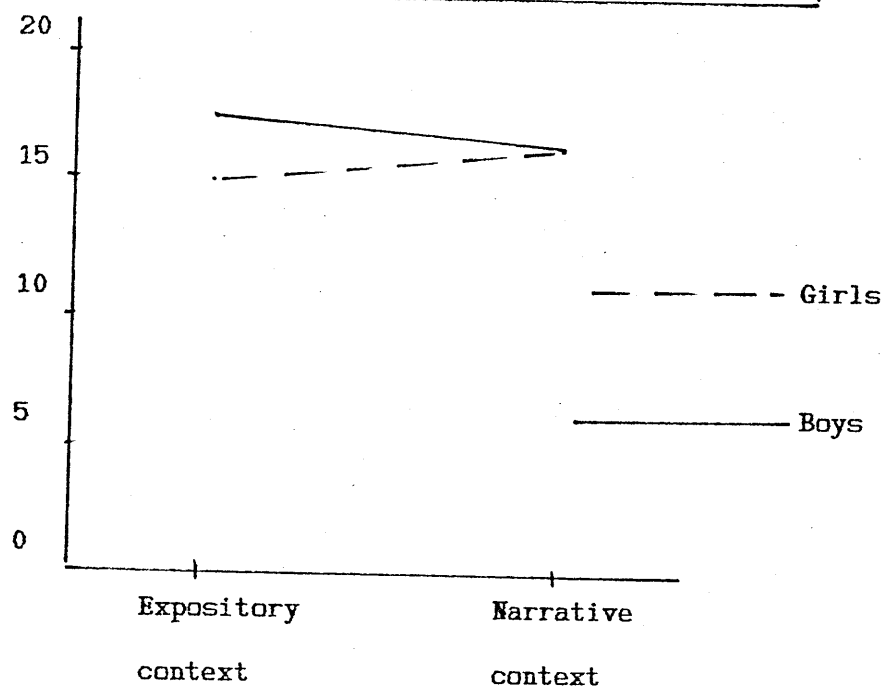
The trends exposed by the tests were clear and uncluttered, but slight: there were no important differences in overall scores due to sex, or due to narrativity of context, when these were examined in isolation; but there did seem to be an interaction effect, with differences between effectiveness of processing narrative and expository passages depending upon the sex of the reader. From equal status as narrative readers, boys improved their score on the expository reading, while girls showed a matching reduction in score. These trends, however, were well short of significance at the 5% level.

As the Diagram Recognition subtest, Part 1 of the test, appeared to offer a slightly different, non-verbal approach to exploring the reader's reconstruction of text, the second analysis was of boys' and girls' scores on this subtest.

TABLE 2: Mean Scores, by sex (Diagram Recognition Subtest)

N=68

		Variable B: Narrativity of Context	
		B1 Narrative	B2 Expository
Variable A	A1 Girls	16.6	15.0
	A2 Boys	15.1	17.1



The trends exposed in the Diagram Recognition Subtest reflected and magnified those exposed by the total scores: on the diagram recognition task, a clear pattern emerged, depending upon whether a boy or girl was reading: girls seemed to be more effective in the narrative mode, and boys in the expository. The results, however, though more marked than those given by the total scores, were still not significant at the 5% level.

It was noticed that one of the two core sections, the Foxtrap, differentiated the pupils' scores more markedly. The third and fourth analyses, then, examined sex differences between expository and narrative processing using an unrelated design, with only the Foxtrap material. In the third analysis, total scores were considered.

TABLE 3: Mean Scores, by sex, (Total scores, Foxtrap material only)

N=60

Variable B Sex		Variable A: Narrativity of Context	
		A1 Narrative	A2 Expository
B1 Girls	B1	32.87	27.6
	B2	30.47 ^{sd}	34.67
B2 Boys	B2		
	Boys		

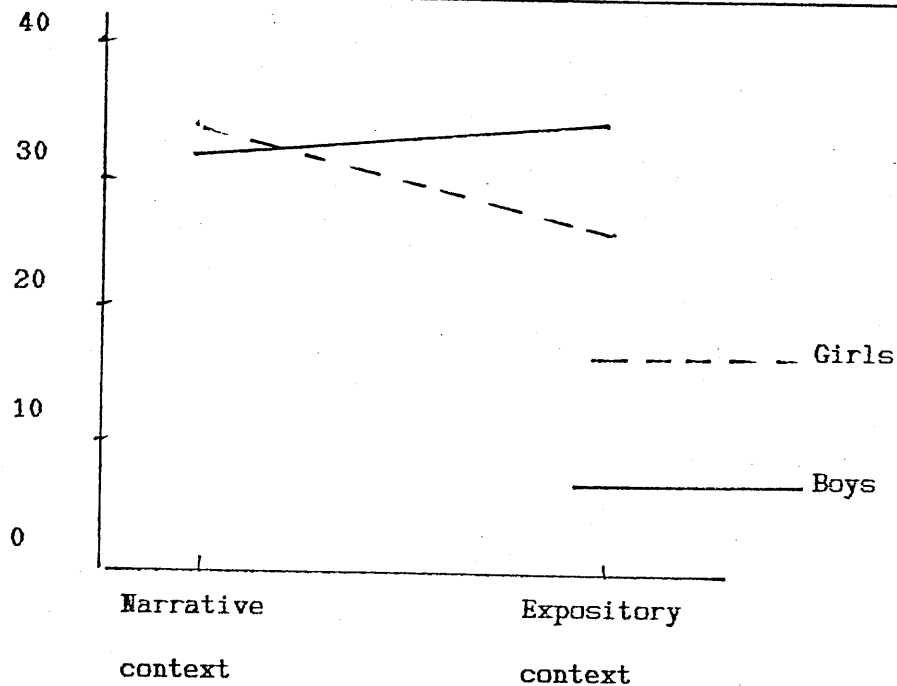


TABLE 4: Analysis of Variance for Foxtrap total scores, by sex

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratios
Variable A (narrative/ exposition)	4.27	1	4.27	$F_{1,56} =$ 0.076 not sig.
Variable B (boy/girl)	81.67	1	81.67	$F_{1,56} =$ 1.46 not sig.
AxB (interaction)	336.06	1	336.06	$F_{1,56} =$ 6.01 sig. $p < .025$
Error (within conditions)	3130.4	56	55.9	
Total	3552.4	59		

The trends that were apparent but not significant when full texts and tests were used in a mixed design become moderately significant using the more differentiated Foxtrap materials. As before, sex and narrativity show no difference when taken separately, but narrative and expository differences do differ significantly depending upon whether a boy or girl is reading ($p < .025$). Again, the boys are relatively more effective in expository, girls in narrative.

In the fourth analysis, Diagram Recognition scores for the Foxtrap material were considered.

TABLE 5: Mean Scores, by sex, (Diagram Recognition subtest, Foxtrap material only)

N=60

		Variable A: Narrativity of Context	
		A1 Narrative	A2 Expository
Variable B	B1 Girls	18.33	14.66
	B2 Boys	15.33	18.66

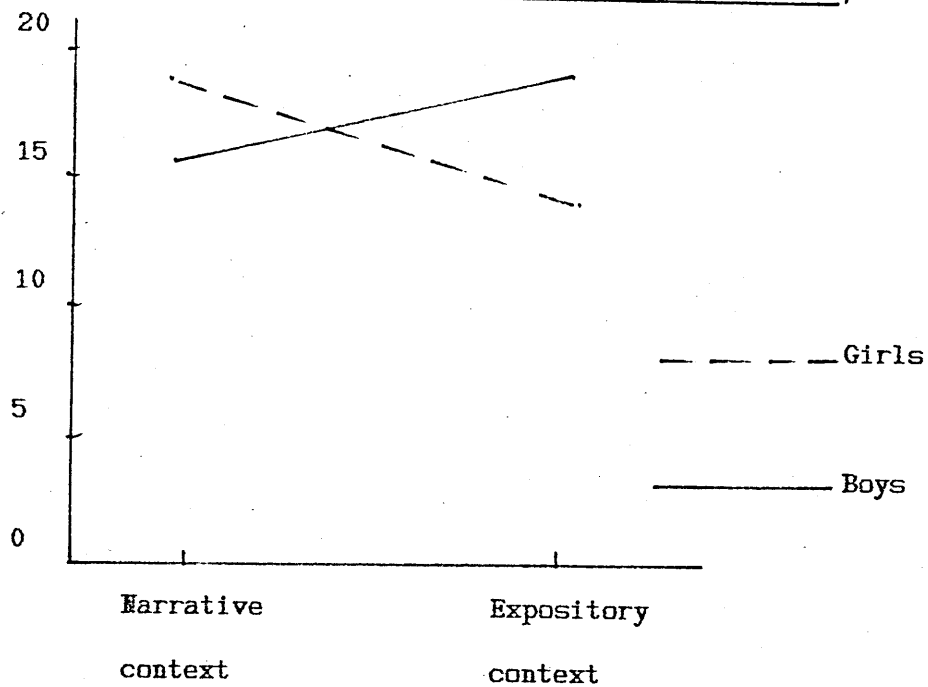


TABLE 6: Analysis of Variance for Foxtrap diagram recognition subtest,
by sex

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratios
Variable A (narrative/ exposition)	0.42	1	0.42	$F_{1,56} =$ 0.025 not sig.
Variable B (boy/girl)	3.75	1	3.75	$F_{1,56} =$ 0.22 not sig.
AxB (interaction)	183.75	1	183.75	$F_{1,56} =$ 10.80 sig. $p < .01$
Error (within conditions)	953.33	56	17.02	
Total	1141.25	59		

As before, earlier patterns are repeated and magnified when the Diagram Recognition subtest is analysed in isolation: while there are no differences in sex or narrativity of context taken alone, there is a significant interaction, boys being relatively more effective in Expository, girls in Narrative. The significance ($p < .01$) was greater than that obtained when the total Foxtrap scores were analysed.

The final analysis disregarded sex (while allowing for it in the design), and considered instead narrative reading ability against narrativity of context. The sixteen most effective and least effective readers of these texts were selected, by ranking the overall total scores. Equal numbers were taken from each topic, to counter any topic effect in the results. No differences in mean scores were noted:

TABLE 7: Mean Scores by ability

N=32		Narrative				Expository			
		1	2	3	total	1	2	3	total
High ability	Mean	19.69	8.38	9.38	37.44	18.13	8.81	9.31	36.94
	S.D.	1.25	1.15	1.15	2.10	3.10	1.28	0.95	3.32
Low ability	Mean	10.31	4.44	4.5	19.25	10	3.5	5.25	18.75
	S.D.	5.31	2.19	2.13	6.41	5.77	1.03	2.18	6.67

4.1.7 Discussion

Taking all the scores, looking at sex and narrativity of context, no difference can be seen if (i) sex, or (ii) narrativity of context are analysed in isolation. But there was a small interaction between sex and narrativity of context, albeit below the level of significance: girls appeared to process the narrative more effectively, while boys performed better on the exposition. The trends suggesting this were small, but uncluttered and consistent across the subtests; they are larger, though still not significant, if scores for the Diagram Recognition subtest only are analysed (Part 1). The ability of the reader does not seem to be a significant factor.

The Foxtrap materials, however, gave greater differentiation of scores; if these are analysed, using a random/ unrelated design, similar trends emerge, of boys dealing relatively more effectively with exposition, girls with narrative. Using total scores, encompassing all the subtests, this interaction has a significance $p < .025$; looking at the Diagram Recognition scores only, the significance reaches $p < .01$.

Hypothesis 1, then, was not supported: there was no general 'set' towards narrativity. Hypothesis 2, however, seems to have been stated too mildly: the set towards narrativity was not 'more marked' among girls; it existed significantly only among girls, boys apparently showing a reverse inclination, towards exposition. Whether this should be attributed to differences in earlier reading experiences and preferences, or to sex distinctive cognitive styles and abilities, remains speculative.

The consistency with which the Diagram Recognition subtest reflected and magnified the trends was interesting: it was a test that made no demands upon verbal skills, but did demand that a clear and functional cognitive representation of the mechanism had been stored in some form, and retrieved in a form that was at least amenable to non-verbal imagery.

4.1.8 Conclusions

This first study allowed no conclusions about the difficulties of processing expository material; it did, however, indicate that they may not be the same for boys and girls. Accordingly, subsequent studies were designed to encompass sex differences in reading scores, and routinely to compare the performance of skilled and unskilled readers.

4.2 Study Two:

Focus: The density and redundancy of text, as defined by the proportion of Given / New information.

Theoretical context: 'New' information in this study is defined as a piece of information, an idea unit, not already referred to in the passage; 'Given' information is a piece of information given earlier in the passage. Thus a passage with a high proportion of Given/ New information has a low density of new information; it is high redundancy text. Where the Given/ New proportion is low, the text has a high density of new information, and a low redundancy. The hypotheses are based on the supposition that the density of new, supporting detail in the high difficulty versions would affect, generally adversely, the processing of the main ideas.

4.2.1 Hypotheses:

1. The high density texts, with a high level of new information, will be processed less effectively than the low density texts. This will be reflected in a poorer grasp of the main ideas and macropropositions.
2. There will be a sex difference apparent in the pupils' responses to high and low density material. (This was suggested by the results of Study 4.1, and is investigated in all the subsequent studies)

4.2.2 Methods:

High and Low difficulty texts were devised, matched as far as possible for all variables except that of the proportion of Given / New information (see 4.2.3 below). The passages were constructed by preparing a common framework of main ideas (see 4.2.3 below), and then developing this framework in two ways: a low difficulty version, where the supporting detail simply reworked and reiterated the same information; and a high difficulty version, where the supporting detail presented discrete, new pieces of supporting information. The test material assessed the information in the common framework only. To counter any effect of topic familiarity, and to allow the potential for both mixed design and unrelated design data analysis, two common frameworks were used, one about a decaying mining village, the other an expanding paper mill. Each common framework was developed into a high and a low difficulty version. Each had its own test. There were thus four passages, two high and two low difficulty, and two tests. Each reader encountered and was tested upon the low difficulty version of one topic, and the high difficulty version of the other. Presentation was alternated between readers to counter the effects of either practice or fatigue. Readers did not have access to the passage during testing, the concern being with the representation stored during a single, normal reading.

4.2.3 Materials

The four passages were built up from the two basic frameworks of main ideas discussed above (see Appendix 2). All dealt with the social effects of geographical/ economic change. Each passage comprised an

introduction, three 'content' paragraphs, and a conclusion. Each 'content' paragraph comprised:

- an introduction to the main idea, manifested in four micropropositions
- the paragraph's main idea, the macroproposition
- a development of the main idea, manifested in four micropropositions.

As explained, each framework was developed in two ways, to give a High and a Low Difficulty version, by varying the proportion of Given/ New information.

Within each topic, Hi/Lo matching of texts is described below.

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
text structure	identical; both followed a covariance structure (Meyer 1975)
text/ para organisation	identical; both followed an 'inductive/ main point/ deductive' structure
given/ new	the variable being manipulated
'signal' words	identical; in all the passages, there was very little use of signal words
inferencing	the high difficulty versions were more demanding than the low difficulty versions, a direct function of the greater number of micropropositional new idea

	units, all of which must be inferentially linked to the macroproposition if comprehension is to succeed
instantiation	similar
causal chain	no dead end events in the samples analysed from each version
concreteness	the high difficulty versions were more concrete and imageable, a function of the specific exemplification they offered.
importance ranking	identical
lexical familiarity	similar
topic familiarity	identical
curriculum area	identical

The high and Low difficulty versions were, then, closely matched, with the unavoidable exception of certain differences in concreteness and inferencing demands:

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
text structure	identical; both followed a covariance structure (Meyer 1975)
text/ para organisation	identical; both followed an 'inductive/ main point/ deductive' structure
given/ new	identical; both topics were built up from parallel information structures

'signal' words	identical; in all the passages, there was very little use of signal words
inferencing	the parallel structures from which the topics were developed meant a very similar level of inferencing
instantiation	instantiation demands in both topics were low
causal chain	no dead end events in the samples analysed from each topic
topic familiarity	topics selected for their local relevance and probable familiarity; further, they balanced each other in that one described community decay, the other growth.
curriculum area	identical

Concreteness, importance ranking and lexical familiarity could not be matched exactly, but the use of the same template and a single writer in generating the material ensured apparently adequate matching.

At the inter-study level, the texts in this study set the pattern for subsequent studies. They sought to be typical, in length, content and style, of the kind of reading pupils may encounter at school.

The experimental texts are shown at Appendix 2A. The passages and tests were colour coded and numbered, for ease of administration:

Passage Red 1 High difficulty

Passage Blue 1 Low difficulty

Passage Red 2 Low difficulty

Passage Blue 2 High difficulty

A test was prepared for each framework of ideas, to be administered directly the appropriate passage had been read. These tests assessed only the ideas in the common basic framework, and were, accordingly, equally applicable to the high and low difficulty versions. At the pre-pilot stage, each test was in three parts:

- Part A involved categorising statements as being True, False, or Not Enough Evidence;
- Part B involved identifying the correct summary from a choice of five, ranging from a correct one to one containing four significant errors;
- Part C involved a closed cloze completion exercise.

Initial pilot trials were carried out on mature, skilled readers, and resulted in extensive revision and redesign of the test material. Further pilot trials were conducted to identify the target population that would yield the clearest discrimination within the 10-14 age group. These were done with an S1 class of moderate/ poor ability, and two groups of S3/4 girls of average ability. The trial results suggested that, in Part B of the test, pupil performance was sometimes erratic and haphazard: the results seemed generally consistent with Part A results (though with poorer discrimination), but occasional pupils offered erratic and deviant responses that gave disproportionate distortion to the results. This, combined with the poor discrimination, caused Part B to be dropped at this stage. The technique of summary identification, though, remained an interesting one, potentially powerful in the global grasp it demands, to be developed and refined for later use. Part C, the closed cloze, failed to discriminate among the responses. Accordingly, Part A only was retained, 30 statements to be classified into categories of True, False, or Not Enough Evidence. It is an assessment technique that rests mainly upon matching the assessment items with stored

representations, and its limitations were discussed in 3.1; but in this case it did probe some significant causal relationships across the passages, and the lack of attributive information in the test passages ensured that there could be no undue emphasis on retention of material that lay off the main causal chains.

(The test material is shown at Appendix 2).

4.2.4 Subjects

The pilot trial results suggested that the material was at an appropriate difficulty level for an upper Primary test population. Two classes of ten and eleven year olds were used, with a normal range of ability ($N=47$). While this population was smaller than intended, the patterns of results obtained (see 4.2.6 below) suggested that, in general, the test population would have to have been very much larger for the trends to have emerged with greater clarity.

4.2.5 Administration

The texts and tests were administered to two upper primary classes by their class teachers (see Appendix 2 for sample Administration Instructions), and the purpose of the experiment was explained briefly. Text allocation was alternated to ensure a balance exposure to the four texts.

4.2.6 Results

Taking all the scores together, there were no differences in performance between the high and low difficulty materials:

TABLE 1 Mean scores

(Maximum score 30, N=47)

	Low density/ high redundancy (lo difficulty)	High density/ low redundancy (hi difficulty)
Mean	19.3	19.9
S.D.	5.12	5.37

Scores were then considered according to the success of the pupils in the test, ranking them by their overall scores (drawing equal numbers from each of the two topics to counter any topic effect). The top ten and the bottom ten pupils from each group were considered:

TABLE 2 Mean scores by ability

(Max score = 30, N=20)

		Low density/ high redundancy (lo difficulty)	High density/ low redundancy (hi difficulty)
High Ability	Mean	24.9	26.9
	S.D.	2.18	1.60
Low Ability	Mean	12.5	12.7
	S.D.	3.66	2.11

Clearly, the density of text did not influence the results of the least successful pupils. There was, however, a difference, significant at the 5% level, for the successful readers: they scored better on the high density material.

TABLE 3 Analysis of Variance for scores by ability

Sources of Variance	Sums of Squares	Degrees of freedom	Mean squares	F Ratio	Probability level
Density of text	20.00	1	20.00	6.923	0.0265
Subjects	39.80	9	4.422	1.531	0.267
Error	26.00	9	2.889		
Total	85.80	19			

Looking at the results for the whole group by sex, there were no significant differences:

TABLE 4 Mean scores by sex

(N boys=31, N girls=16)

		Low density/ high redundancy (lo difficulty)	High density/ low redundancy (hi difficulty)
Girls	Mean	19.3	19.7
	S.D.	6.38	5.13
Boys	Mean	19.3	19.9
	S.D.	4.31	5.49

4.2.7 Discussion

The main supposition upon which the hypotheses were based was not supported by the evidence collected. Hypothesis 1 suggested that a high density of new information would impede processing. It did not appear to do so: for the most successful readers, there was a significant reverse effect, with good readers scoring more highly when presented with a high density of supporting detail.

Hypothesis 2 predicted a sex difference. This was not supported, and no differences could be detected.

4.2.8 Conclusions

The single significant result ran counter to the hypothesis. It suggests that a high level of supporting detail might facilitate comprehension for the successful reader, and have little or no effect on the less successful reader.

4.3 Study Three:

Focus: Cohesive explicitness and the role of 'signal' words.

Theoretical context: Where cohesive links are not made

explicit, the reader must infer the links. This may be called Cohesive Inferencing (as distinct from Propositional Inferencing - see Study 4). Cohesive Inferencing may involve such logical connectives as causal or temporal signal words, or cataphoric/ anaphoric reference.

e.g/. in

"The timbers came together with a snap. Harry swore loudly.

His finger was trapped between them."

The reader infers at least the following cohesive links:

- Harry swore BECAUSE the timbers trapped his finger
- he swore AFTER the timbers came together
- the 'them' refers anaphorically to 'the timbers'

In this study, the focus is upon these logical connectives. Because passages that use little anaphoric/ cataphoric pronominal reference do not 'read naturally', it was not possible to construct ecologically valid texts that featured this, and the emphasis is upon signal words rather than pronominal reference. The hypotheses are based upon the supposition that processing is facilitated when such cohesive links are made explicit, despite the longer sentences that this often entails (see 4.3.3 below).

4.3.1 Hypotheses

1. Texts which use explicit 'signal' words to indicate cohesive links are processed more effectively than those in which the cohesive links remain implicit. This will be reflected in a better grasp of the links themselves (as shown by Part A test scores), and in more effective storage of the overall content (as shown by Part B test scores).
2. There will be a sex difference apparent in the pupils' responses depending upon whether the signal words are explicit or implicit. (This was suggested by the results of Study 4.1, and is investigated in all the subsequent studies.)

4.3.2 Methods

For two topics, high and low difficulty texts were constructed, varying in the extent to which their cohesive links were explicit. Both topics dealt with extended journeys, and both were developed from the same structural blueprint:

- Introduction
- Content para. 1: introduction to main idea; main idea/ macroproposition; development of main idea.
- Content para. 2: introduction to main idea; main idea/ macroproposition; development of main idea.
- Content para. 3: introduction to main idea; main idea/ macroproposition; development of main idea.
- Conclusion

Each topic had its own test. There were thus four passages, two high and two low difficulty, and two tests, one for each topic. Each reader encountered and was tested upon the low difficulty version of one topic, and the high difficulty version of the other. Presentation was alternated between readers to counter the effects of practice or fatigue. Each pupil read one high difficulty passage, and one low difficulty passage. The pupil was assessed immediately after each reading. Readers did not have access to the passage during testing, the concern being with the representation stored during a single, normal reading.

4.3.3 Materials

One topic dealt with a journey across Canada by three animals, the other with a yacht in a storm. As explained above, each was built up from the same blueprint, to maximise matching across topics, and the High and Low difficulty versions were derived simply by the inclusion or omission of 'signal' words.

Text matching at the 'Hi/ Lo' level was, then, very close, with the perhaps important exceptions of sentence length and number, and some perhaps less critical differences in importance ranking (see below):

Variable, and degree of matching

passage length	identical
sentence length	some much longer sentences in the Lo difficulty versions, where the presence of the 'signal' word sometimes links two simple sentences into a single compound sentence; paradoxically, this meant that

	the texts expected to be harder had shorter
	sentences, and would show lower reading ages on
	arithmetical measures of reading age
sentence numbers	fewer sentences in the Lo difficulty versions, as
	explained above
text structure	identical
text/ para organisation	
	identical
given/ new	identical
'signal' words	the variable being manipulated
inferencing	propositional inferencing was identical; (cohesive
	inferencing was a function of the 'signal' words,
	and thus being manipulated between the Hi and Lo
	difficulty versions)
instantiation	identical
causal chain	identical
concreteness	identical
importance ranking	similar, except that where the 'signal' words were
	explicit, the hierarchical relationships between the
	propositions were perhaps made more obvious than
	where they were left for the reader to infer
lexical familiarity	identical
topic familiarity	identical
curriculum area	identical

Text matching at 'Topic' level seemed relatively close:

Variable and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
text structure	identical
text/ para organisation	identical
given/ new	the common structural blueprint ensured a relatively close match
'signal' words	again, the common blueprint ensured a close topic match
inferencing	both topics were fairly explicit, making only fairly modest inferencing demands of the reader
instantiation	relatively low instantiation demands in both topics
causal chain	although both topics were characterised by a relatively large number of causal fields, each with rather short causal chains, there were very few dead end events in either topic
concreteness	both were easily imageable

Importance ranking, lexical familiarity, topic familiarity and curriculum area could not be exactly matched, but the use of the same template and a single writer in generating the material ensured apparently adequate matching.

At the inter-study level, text structure and organisation exactly matched that used in Study 2. The passages were of similar length, and from a loosely similar curriculum area, although of a rather different genre: these passages were closer to narrative, in that both topics told

the story of an epic journey. Again, there was approximate similarity in many of the other variables: few events lay off the causal chains; there were few instantiation demands; the topics were easily imageable; demands made on propositional inferencing seemed roughly parallel; there were no obvious differences in the proportions of Given/ New information; and topics and lexis were all fairly everyday, and familiar enough to most readers. Apart, then, from the more narrative nature of these Study 3 passages, the passages were broadly similar to those that set the pattern in Study 2.

(See Appendix 3 for the experimental texts. The passages and tests were colour coded and numbered, for ease of administration:

Passage Red 1 High Difficulty

Passage Blue 1 Low Difficulty

Passage Red 2 Low Difficulty

Passage Blue 2 High Difficulty)

The tests were in two parts. Part A aimed at the causal links that were explicit in the low difficulty passages, and implicit in the high difficulty passages. At the pilot trial stage it was a multiple choice test, with the options depending upon recognition of the correct causal link; pupils found this very difficult, and it discriminated very poorly. The test was therefore modified: the new form involved selecting the appropriate ending to some unabashed sentences. Part B aimed at the content and stored cognitive representations, and consisted of open-ended questions. These discriminated well, and scoring presented no problems of ambiguity. (See Appendix 3 for tests and answer sheets.)

4.3.4 Subjects

The pilot trial results suggested that the material was at an appropriate difficulty level for an upper Primary population. Two classes of ten and eleven year olds were used, with a normal ability range ($N=49$). While this population was smaller than intended, the patterns of results obtained (see 3.3.6 below) suggested that, in general, the test population would have to have been much larger for the trends to have emerged with greater clarity.

4.3.5 Administration

The texts and tests were administered to two upper Primary classes by their class teachers (see Appendix 12 for sample administration instructions), and the purpose of the experiment was explained briefly. Text allocation was alternated to ensure a balanced exposure to the four texts.

4.3.6 Results

Overall, there were no significant differences between pupil performance on the materials with explicit or implicit cohesion.

TABLE 1 Mean scores

(Max. scores Part A=10, Part B=18, total=28. $N=49$)

	Cohesion explicit			Cohesion implicit		
	Part A	Part B	Total	Part A	Part B	Total
Mean	4.8	8.0	12.8	4.6	8.6	13.2
S.D.	3.18	3.86	5.86	3.34	3.69	5.65

Looking at the results by sex, there were no significant differences.

TABLE 2 Mean scores by sex

N(boys)=31 N(girls)=18

		Cohesion explicit			Cohesion implicit		
		Part A	Part B	Total	Part A	Part B	Total
Girls	Mean	5.0	8.2	13.2	5.1	8.9	14.1
	S.D.	2.77	3.69	5.12	3.54	2.93	5.47
Boys	Mean	4.6	7.9	12.5	4.3	8.4	12.7
	S.D.	3.38	3.95	6.24	3.17	4.05	5.70

Scores were then considered by the success of the pupils in the test. They were ranked according to overall total scores (drawing equal numbers from each of the two topics to counter any topic effect). The top and bottom ten pupils were considered.

TABLE 3 Mean scores by ability

N=20		Cohesion explicit (lo difficulty)	Cohesion implicit (hi difficulty)
Hi ability	Mean	19.9	20.7
	S.D.	1.79	2.26
Lo ability	Mean	3.8	6
	S.D.	1.40	1.05

Successful readers seemed relatively unaffected by the presence or absence of signal words. The performance of the less successful pupils, however, showed a distinct difference in scores, albeit running counter to the hypothesised direction of difficulty. It was analysed using a one way analysis of variance, and showed significance at the 1% level.

TABLE 4 Analysis of Variance of scores by ability

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean squares	F Ratios	Probability
Cohesion explicit/implicit	24.2	1	24.2	14.72	0.0040
Subjects	12.8	9	1.422	0.865	0.5841
Error	14.8	9	1.644		
Total	51.8	19			

4.3.7 Discussion

The main supposition upon which the hypotheses were based was not supported by the evidence collected: there were no significant differences in the hypothesised direction. There was, however, a small but fairly consistent tendency in the reverse direction: explicit cohesive links seemed generally to hinder rather than help processing. For the least able pupils, the reversal of Hypothesis 1 was decisive: they managed significantly better without explicit cohesive links.

Hypothesis 2 predicted a sex difference; while the mean scores of girls were a little higher than those of boys in all the tests, the differences were not statistically significant.

4.3.8 Conclusions

Only one result stands out, and it supports traditional wisdoms with respect to sentence length: less successful readers manage better with shorter sentences, even if that brevity is achieved at the cost of apparently important cohesive links.

4.4 Study Four

Focus: Level of Inferencing

Theoretical Context: Two different kinds of inferencing were posited in Study 4.3: Cohesive Inferencing, which was the focus of Study Three, and Propositional Inferencing, the focus of this study. While these two types of inferencing may overlap, they seem separate enough to merit separate examination. Propositional Inferencing, the focus of this study, is the kind of inferencing where the reader has to generate whole propositions, or a sequence of propositions, to link together the propositions that are stated explicitly in the text.

e.g. in

"He closed his eyes and hurled himself into space. His broken body was recovered from the beach the next morning."

the reader must infer at least the following propositions if understanding is to be adequate:

- he was on a cliff edge
- he was killed by his fall
- it appeared to be suicide

Hildyard and Olsen (1982) describe these inferences as Enabling Inferences, as they are necessary if the reader is to make any sense of the discourse.

The hypotheses are based on the supposition that, for the successful reader at least, such inferencing is a natural activity of the brain, congruent with the way schemas are utilised in the processes of reading and interpreting. Loosely speaking, it is

supposed that, for the good reader, the brain operates in an optimum mode if given a reasonable and manageable level of such propositional inferencing. The poorer reader will still probably prefer to have it 'spelled out'.

4.4.1 Hypotheses

1. For the successful readers, the texts where the linking propositions remain implicit will be processed more effectively than those where the linking propositions are explicitly stated. For the less successful readers, the reverse will hold true, and comprehension will be enhanced by making explicit the linking propositions.
2. There will be a sex difference apparent in the pupils responses to different levels of inferencing demand (This sex dimension was suggested by the results of Study 4.1, and is investigated in all the subsequent studies.)

4.4.2 Methods

Texts were constructed by taking thirty groups of (usually) three sentences/ propositions. The groups of sentences were assembled so that the middle of the three could be regarded as an Enabling, or Propositional, Inference, and could either be stated explicitly in the text, or be omitted, so that the reader had to infer it from the content of the preceding and succeeding sentences/ propositions in that group. Fifteen of the sentence groups formed a passage "Safety and Comfort in the Air", while the other fifteen made up the passage "At the Airport."

(See Appendix 4). Each text had one version where the inferential links were stated explicitly, and one where they were left for the reader to infer. This made four experimental texts, and each subject did one with the propositions explicit, and one with them implicit. The pupil was assessed immediately after each reading, and did not have access to the passage during reading

4.4.3 Materials

The passages were constructed as explained in 4.4.2 above (see App. 4). Considering the matching between high and low difficulty versions of the same topic:

Variable, and degree of matching

passage length	a marked difference; because the 'links implicit' version was arrived at simply by omitting all 15 linking propositions, it was markedly shorter than the version where these propositions remained explicit
sentence length	identical, except for the complete absence of 15 sentences
sentence numbers	15 sentences shorter in the 'links implicit' versions
text structure	identical, apart from the differences implied in the omission of 15 enabling inferences
text/ para organisation	identical, apart from the differences implied in the omission of 15 enabling inferences

given/ new	identical, apart from the differences implied in the omission of 15 enabling inferences
'signal' words	identical
inferencing	the variable being manipulated
instantiation	identical
causal chain	identical
concreteness	identical, apart from the differences implied in the omission of 15 enabling inferences
importance ranking	identical
lexical familiarity	similar
topic familiarity	identical
curriculum area	identical

As can be seen, omission of the fifteen enabling/ propositional inferences affected significantly the passage length and the number of sentences. It also affected, arguably much less significantly, the proportion of Given/ New, and the structure of the passage and its component parts. Despite these qualifications, it was felt that the two versions were closely enough matched for any results to be valid.

Text matching at 'Topic' level was quite close:

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
given/ new	similar
'signal' words	a very low level in both topics

inferencing	closely similar across the topics, and the manipulated variable within the topics
instantiation	a fairly low level of demand in both topics
causal chain	both topics were characterised by short causal chains, but an absence of dead end events within each causal field
topic familiarity	different aspects of the same topic
curriculum area	identical

Text structure, paragraph organisation, concreteness, importance ranking and lexical familiarity could not be exactly matched, but the use of the same template and a single writer in generating the material ensured apparently adequate matching.

Text matching at the inter-study level was surprisingly robust: what seemed a rather different kind of text turned out, on closer and more careful inspection, to be more similar than first appeared. Curriculum area, approximate length (apart from those differences discussed above), familiarity of topic and lexis, signal words, instantiation, concreteness, importance ranking, paragraph structure, and the lack of events lying off the causal chain, all fell well enough into the mould set by earlier studies. However, text structure was closer to Study 2 than Study 3, as was the nature of the causal fields: Study 3 used texts that tended towards the narrative; this study returned to the kind of list-like pattern that Meyer (1984) calls an attributive discourse structure.

The assessment was initially in three parts, and focussed upon the link propositions. Part 1 used multiple choice with ranking to probe whether or not the inference was made, either at initial reading, or when confronted by the test item. It involved matching, in the working

memory, the meanings stored during reading with those presented by the test items. Part 2 sought to expand on this, demanding more global comprehension by ranking summaries according to how correct they are. In Part 3, the reader's grasp of the inference material was probed by short answer questions, demanding some search and retrieval, but also needing some production skills, and awareness of examiner expectations. Data from Part 3 was, however, rejected: two of the test items used the phrasing "How do / does...", and with the Scottish test population this led to ambiguity - "how" is synonymous with "why" in the dialect of that population. More important, it did not seem possible to score the responses with any certainty of objectivity.

4.4.4 Subjects

S1 opportunity samples were used, from classes with a normal ability range (N=45).

4.4.5 Administration

The texts and tests were administered by the experimenter or a colleague. The purpose of the experiment was explained briefly. Text allocation was alternated to ensure a balanced exposure to the four texts. The texts were colour coded for ease of administration:

Red 1	Safety and Comfort in the Air	Explicit
Red 2	Safety and Comfort in the Air	Implicit
Blue 2	At the Airport	Explicit
Blue 1	At the Airport	Implicit

(See Appendix 12 for sample administration instructions)

4.4.6 Results

There were no significant differences between mean scores for any of the subtests:

Table 1. Mean scores (Max. 55)

N=45	Explicit inferences			Implicit inferences		
	Pt.1	Pt.2	Total	Pt.1	Pt.2	Total
Mean	30.93	6.76	37.64	28.87	5.87	34.73
S.D.	8.12	3.50	10.20	8.00	3.75	9.96

The same pattern emerged when the scores were looked at topic by topic, with mean scores for the material with implicit inferencing consistently lower:

Table 2: Mean scores for "At the Airport"

N=45	Explicit inferences			Implicit inferences		
	Pt.1	Pt.2	Total	Pt.1	Pt.2	Total
Mean	32.24	7.14	39.86	29.87	7.41	37.29
S.D.	8.12	2.87	8.50	9.70	2.86	11.49

Table 3: Mean scores for "Safety and Comfort in the Air"

N=45	Explicit inferences			Implicit inferences		
	Pt.1	Pt.2	Total	Pt.1	Pt.2	Total
Mean	29.37	6.41	35.71	27.71	4.10	32.29
S.D.	8.15	4.00	11.30	5.49	3.92	7.78

The difference in Part 2 of the test for "Safety and Comfort in the Air" fell only just short of statistical significance at the 5% level, using an unrelated analysis of variance.

When results were looked at by sex, there were again no significant differences, although the inferencing demands discriminated more among boys than among girls:

Table 4: Mean Scores by sex

N=45		Explicit inferences			Implicit inferences		
		Pt.1	Pt.2	Total	Pt.1	Pt.2	Total
Boys	Mean	31.90	6.95	38.76	28.81	5.43	34.24
	S.D.	8.25	3.67	10.75	8.38	3.75	10.32
Girls	Mean	30.08	6.58	36.67	28.91	6.25	35.17
	S.D.	8.09	3.41	9.81	7.84	3.79	9.83

Examination of the results by ability confirmed the same pattern again, of consistently lower mean scores on the material where inferencing was implicit, regardless of the ability of the reader. Readers were ranked by their total scores on both tests, and the top and bottom 10 selected for comparison. Equal numbers were taken from each topic, to allow for any topic effect. Again, the differences fell short of statistical significance:

Table 5: Mean scores by ability (total scores only)

N=20		Explicit inferences	Implicit inferences
High ability	Mean	47.2	45.3
	S.D.	3.58	6.62
Low ability	Mean	24.3	22.4
	S.D.	10.20	5.19

4.4.7 Discussion

Hypothesis 1 is not supported - the trend was in a reverse direction for the more successful readers, and mean scores for the

passages with implicit inferencing demands were lower. Mean scores for the 'implicit' materials were also lower for the least successful readers; this was as hypothesised, but the differences were not significant. Nor was Hypothesis 2 supported; although the mean scores suggested that girls might be less daunted than boys by higher inferencing demands, the interaction fell well short of statistical significance, and must await a larger test population for further clarification. Ability was clearly not an important factor.

4.4.8 Conclusions

There is, then, no evidence that any reader in this test population, skilled or unskilled, operates more effectively when faced with relatively high inferencing demands. While there were no significant differences in overall mean scores, or in mean scores when looked at by sex or by ability, there were clear and consistent patterns that fell only a little short of statistical significance, and are worth noting: mean scores for material where the inferences were left for the reader to generate (the 'implicit' materials) were consistently lower.

4.5 Study Five

Focus: Lack of Structure.

Theoretical context: In a schematic model of reading, every aspect of previous experience is stored down into a system of easily accessible packages. This system is designed to minimise the work involved in processing new input, by recognising within it any patterns already experienced. Once recognised, they need not be processed in full: it is enough to scan them, both to note how they deviate from the stored pattern, and to focus more closely on those points where previous experience suggests there may be significant information. Every aspect of previous experience is thus stored and utilised; but a particularly significant feature of expository reading may be experience of the passage's structure. A familiar structure, then, will allow predication, highlight the deviant, and guide attention to the significant.

Probably the most commonly experienced structures in reading are those typical of narrative. Even young children might be expected to have internalised them, from listening to or reading stories. They would have a wide range of stock characters and situations to draw upon. (The phrase 'stock' is a significant one, implying, as it does, a store.) Beyond narrative, the reader would be less likely to have such a resource to draw upon, having had far less experience of consistent and similar structures. Where the structure is not familiar, then, (and for some readers, structures other than narrative may not be familiar) the reader will be less able to predict, and will be slower to identify the significant information, or note the deviant. The hypotheses are based on this

supposition, that lack of familiar structure will impede processing.

4.5.1 Hypotheses

1. Lack of familiar structure impedes processing. This will be reflected in lessened recall of the main and supporting points (Part A of the assessment); a reduced grasp of the cause/ effect relationships in the passage (Part B of the assessment); and a reduced grasp of the inter-relationships that link together the different sections of the passage (Part C of the assessment).
2. There will be a sex difference apparent in the pupils' responses to the different structures (This sex dimension was suggested by the results of Study 4.1, and is investigated in all the subsequent studies).

4.5.2 Methods

High and low difficulty texts were constructed, varying in the degree to which their structures might be expected to be familiar to the reader. In the low difficulty versions, the structure was familiar and predictable; the high difficulty versions were nearly identical to the low difficulty versions, except that the order of the main elements of the text was "jumbled". Presentation of the texts was alternated to allow for the effects of practice and fatigue. Each pupil read one high difficulty passage, and one low difficulty passage. The pupil was

assessed immediately after each reading, and did not have access to the passage during assessment.

4.5.3 Materials

Hypothetical historical reconstructions were used in devising the texts, drawing upon another time and another place, to lessen interference from readers' previous knowledge. One topic dealt with the development of the wheel, the other with the development of a new kind of boat. A narrative structure was chosen, as this seemed likely to be the only structure familiar to all readers, and at the same time amenable to "jumbling".

The elements common to all the passages were:

- | | |
|----------------------|-------------------------|
| (i) setting | (ii) hero |
| (iii) problem arises | (iv) problem tackled |
| (v) problem solved | (vi) happily ever after |

Without drawing directly upon any one story grammar, these elements, in this order, seemed to represent a fairly typical narrative structure.

The contents of each element were as follows:

SETTING	weather and landscape; deadline; workers; mechanics of task.
HERO	appearance; position/ status
PROBLEM ARISES	its nature; its implications
PROBLEM TACKLED	idea dawns/ source of idea; works out how it might be done; decides to try it
PROBLEM SOLVED	new apparatus seen working
HAPPILY EVER AFTER	flash forward: problem now a thing of the past.

They were presented in this order for the low difficulty versions, and jumbled for the high difficulty versions. The order of elements in the different passages was as follows:

<i>Low difficulty for both topics</i>	<i>High difficulty "WHEELS"</i>	<i>High difficulty "BOATS"</i>
setting	happily ever after	happily ever after
hero	problem arises	problem solved
problem arises	hero	problem arises
problem tackled	setting	setting (1st. part)
problem solved	problem solved	hero
happily ever after	problem tackled	setting (2nd. part)
		problem tackled

It can be seen that matching between the High and Low difficulty versions within each topic was very close indeed:

Variable, and degree of matching

passage length identical

sentence length identical

sentence numbers identical

text structure the variable being manipulated

text/ para organisation

identical paragraph organisation, though the position of the main points at a whole text level was clearly affected by the manipulation of the text structure

given/ new identical

'signal' words identical

inferencing	identical at a local level; the altered paragraph sequence would affect some aspects of the inferencing task at a global level
instantiation	identical
causal chain	identical
concreteness	identical
importance ranking	very close, although the narrative altered sequence might have implications for some readers
lexical familiarity	identical
topic familiarity	identical
curriculum area	identical

Comparing the two topics used, matching was again quite close:

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
text structure	identical in the low difficulty versions, but differently 'jumbled' for the high difficulty versions
text/ para organisation	identical in the low difficulty versions, though the different 'jumbling' for the high difficulty versions would affect the location of the main points at a whole text level
concreteness	both topics were concrete and easily imageable

importance ranking identical across the low difficulty versions, though the different 'jumbling' for the high difficulty versions may have had some implications for some readers

Certain features could not be matched exactly: given/new, signal words, inferencing, instantiation, causal chain characteristics, lexical familiarity, topic familiarity, and curriculum area. But the use of the same template and a single writer in generating the material ensured apparently adequate matching.

Looking at inter-study comparability, the passages were longer than those in Studies 2,3 and 4, but still taking only five or ten minutes for the average reader to read. Sentence lengths were similar, and there were no obvious differences in inferencing and instantiation demands, the proportion of Given/ New, concreteness, importance ranking, lexical and topic familiarity, and curriculum area. Causal chain characteristics showed the distinctively extended causal fields of narrative text, and structure and organisation were typical of narrative. (The texts are shown at Appendix 5.)

Assessment was in two parts at the first stage of piloting:

Part A - Categorising statements as 'True / False/ Not Enough Evidence', to probe whether recall of main points or supporting detail was affected by unfamiliar structure

Part B - 4 option multiple choice items, emphasising the key causal relationships across each passage.

Following some unexpected trends in the results of initial pilot trials, suggesting that less able readers might prefer the unfamiliar structure, a third part, Part C, was added to the assessment, using an

adapted discourse cloze (Levenston et al 1984). In this part, cloze items were prepared from a sequence of gist statements, each of which sought to link two or more different sections of the passage. In discourse cloze, all of the options offered make sense at a local level, but only one makes sense at the global level. The tests and answer sheets can be seen at Appendix 5.

4.5.4 Subjects

Two S1 classes were used, with a normal ability range. Allowing for absences and incomplete responses, this meant an experimental population of 51.

4.5.5 Administration

The texts and tests were administered to the two S1 classes by the experimenter. The purpose of the experiment was explained briefly. Text allocation was alternated to ensure a balanced exposure to the four texts.

The texts were colour coded for ease of administration:

'From Rollers to Wheels'	(Lo Difficulty)	Red 1
'From Rollers to Wheels'	(Hi Difficulty)	Red 2
'Early Boats'	(Lo Difficulty)	Blue 2
'Early Boats'	(Hi Difficulty)	Blue 1

(See Appendix 12 for sample administration instructions)

4.5.6 Results

The mean scores for the jumbled structures were a little lower than those for the normal structures, but the differences were not significant.

TABLE 1. Mean Scores

N=51		Part A	Part B	Part C	Total
Jumbled structure	Mean	17.27	3.29	6.45	27.02
	S.D.	4.70	1.27	3.20	6.90
Normal structure	Mean	17.82	3.72	6.82	28.37
	S.D.	4.85	1.20	3.04	8.01

Table 2 looks at the results by topics.

Table 2. Mean scores by topic (Total scores)

N=51		Early Boats	From Rollers..
Jumbled structure	Mean	26.46	27.70
	S.D.	7.17	6.64
Normal structure	Mean	28.91	27.92
	S.D.	7.96	8.18

While the 'Early Boats' topic seemed to differentiate more effectively between readers on the jumbled and normal structures, the difference fell a little short of statistical significance. It seemed worth, however, considering the subtests for this topic more closely.

Table 3. Mean Scores for the subtests in 'Early Boats'

N=51		Part A	Part B	Part C
Jumbled structure	Mean	17.5	3.04	5.92
	S.D.	4.86	1.26	3.22
Normal structure	Mean	18.17	3.70	7.04
	S.D.	5.33	0.97	2.53

While the differences in Parts A and C of the test fell short of statistical significance, the difference in Part B, the part of the test focussing on causal relationships across the passage, was significant at the 5% level, using a one way unrelated analysis of variance.

TABLE 4. Analysis of Variance for the Part B sub-test in 'Early Boats'

Sources of Variance	Sums of Squares	Degrees of freedom	Mean Squares	F ratio
Structure	5.50	1	5.50	4.22
Error	63.83	49	1.30	
Total	69.33	50		

Results were then considered by sex, using all the scores, from both topics. Mean scores are shown in Table 4.

Table 5. Mean total scores, by sex

N(girls)=23 N(boys)=28

	Girls		Boys	
	Normal structure	Jumbled structure	Normal structure	Jumbled structure
Mean	26.74	26.87	29.71	27.14
S.D.	7.05	6.36	8.62	7.42

The girls appeared to find no difference in difficulty between the two structures, while the mean score for the boys was lower on the jumbled structure. The difference was not far from significance at the 5% level, meriting closer attention. Accordingly, the subtests were considered separately. On Part B, there was a clear difference in mean scores:

Table 6: Mean scores on Part B, boys only (max score 5)

N=28	Normal structure	Jumbled structure
Mean	3.96	3.32
S.D.	1.32	1.31

Analysis of variance showed this to be significant at the 5% level:

TABLE 7. Analysis of Variance of boy's scores in Part B

Sources of Variance	Sums of squares	Degrees of freedom	Mean Squares	F Ratio
Structure	5.79	1	5.79	5.54
Subjects	64.86	27	2.40	
Error	28.21	27	1.04	
Total	98.86	55		

Lastly, the results were considered by ability. Ability was judged by the overall total scores. The top and bottom 10 scores were taken (5 from each topic, to counter any topic effect in the scores).

TABLE 8: Mean scores, by ability (max 45)

N=20			Structure	
			Normal	Jumbled
Ability	High	Mean	36.8	35.9
		S.D.	3.08	1.66
	Low	Mean	16.1	19.1
		S.D.	3.48	5.47

The mean scores suggested that the least able readers found the jumbled structures more amenable; but the high standard deviations show how scattered were the scores, and the difference fell well short of statistical significance ($p=0.128$)

4.5.7 Discussion

The first hypothesis was partly supported: while the overall means showed little difference in mean scores according to structure, one of the topics did differentiate more effectively ('Early Boats'), and

showed a consistent pattern across the subtests of the Jumbled structure causing greater difficulty. This difference was significant in that part of the assessment looking at causal relationships across the passages: readers found it easier to perceive causal relationships when this text was presented in normal narrative structure.

The second hypothesis was similarly partly supported: there was a significant sex effect, in that boys found these same causal relationships easier to perceive in normal narrative structure, while girls seemed unaffected by the structure.

There was a suggestion of an ability effect, though it fell short of significance: mean scores for successful readers were a little lower for the unfamiliar, jumbled structure, while unsuccessful readers showed a higher mean score when the structure was jumbled.

4.5.8 Conclusion

Structure did seem to affect comprehension to some extent. In general, it appeared to act in the expected direction, with unfamiliar structures impeding comprehension.

4.6 Study Six

Focus: Instantiation

Theoretical context: Meanings and concepts can be seen as being organised in hierarchical semantic networks. For example, the word 'spaniel' realises a concept at a fairly specific level within a network that includes the concepts 'dog' and 'animal' at more general levels. A word in a text can be seen as a cue to a reader, an entry point to a hierarchical semantic network.

For a concept or meaning to be realised by a reader, the reader must 'instantiate' that meaning or concept - that is, provide a specific instance, drawn from that semantic network, that fits the developing meaning of the passage. This is a form of inferencing, which may or may not be easy. Presumably it depends upon the level within the semantic network at which the writer has provided the cue, whether the cue is at a general or specific level. For example, a passage may be a story about a spaniel named Bonzo. At any given point in the story, the writer may cue the reader by reference to the 'animal', 'dog', 'spaniel', or directly to 'Bonzo'. Given the cue, the reader has to enter the appropriate semantic network, and provide an appropriate instantiation. Does it impose a greater cognitive load to instantiate the concept if the cue was at a general rather than specific level, if it was 'animal' rather than 'spaniel'? At what level does the reader instantiate if faced with a general rather than specific cue? Does reading become more difficult if cues are consistently at a general rather than specific level?

The hypotheses are based on the supposition that heavy instantiation demands will impede reading.

4.6.1 Hypotheses

1. The comprehension of successful readers will be unaffected by instantiation demands; further, they will routinely instantiate at a high level of specificity, regardless of whether the cues presented by text are at a general or specific level.
2. The comprehension of less successful readers will be impeded by high instantiation demands; they will normally only instantiate at a high level of specificity when presented with text cues at a high level of specificity.
3. There will be a sex difference apparent in pupils' responses to varying instantiation demands (this sex dimension was suggested by the results of Study 4.1, and is investigated in all subsequent studies).

4.6.2 Methods

High and low difficulty texts were constructed, varying in the instantiation demands they presented. In the low difficulty texts, the cues provided by the text were at a specific level; in the high difficulty texts, they were at a more general level. Presentation of the texts was alternated to allow for the effects of practice and fatigue. The assessment instrument was designed to probe simultaneously the general comprehension level of the reader, and the degree to which the

reader instantiated at a high level of specificity. Each pupil read one high difficulty passage and one low difficulty passage. The pupil was assessed immediately after each reading, and did not have access to the passage during assessment.

4.6.3 Materials

High and low difficulty texts were developed for two topics. Both topics considered an imaginary community, a mining settlement on an Arctic island. One looked at the way people lived in the community, the other the working life in the community. The passage structure for both topics was an attributive, or list-like, one.

Matching of texts between the High and Low difficulty versions within each topic was very close, the only possible mismatch being in the area of lexical familiarity:

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
text structure	identical
text/ para organisation	identical
given/ new	identical
'signal' words	identical
inferencing	identical, except those inferencing demands stemming from instantiation demands

instantiation	the variable being manipulated
causal chain	identical
concreteness	identical
importance ranking	identical
lexical familiarity	very similar, except that specific cues are likely often to be more familiar than general cues; e.g. to use 'drinking vessel' instead of 'cup', or 'container' instead of 'bottle', would probably lessen lexical familiarity. This represented a real difficulty in matching texts for lexical familiarity, one which was minimised but probably not fully avoided.
topic familiarity	identical
curriculum area	identical

Comparing the two topics, matching was very close:

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
curriculum area	identical

Some text features could not be matched exactly: text structure, paragraph organisation, proportion of given/new, signal words, inferencing, instantiation, causal chain characteristics, concreteness, importance ranking, lexical and topic familiarity. But the use of the same template and a single writer in generating the material ensured apparently adequate matching.

Looking at inter-study comparability, there was considerable similarity to the passages used in Studies 2 and 4, both these having similar attributive structures, lengths and general characteristics. There was less similarity to the passages in Studies 1, 3 and 5, where structures were closer to narrative.

The assessment was designed primarily to probe what had been stored at each target instantiation - it was thought that comprehension of the passages overall concepts and relationships was unlikely to be affected by the variable being manipulated. Ranked multiple choice was chosen as the means of assessment, where the reader chooses between a correct response at the specific level, a correct response at the general level, and two other responses that cannot be confirmed from the evidence in the passage. This, it was hoped, would allow measurement of general comprehension as well as indicating the level at which the reader was instantiating the concepts encountered. Care was taken to avoid use of the passage's structures in the test questions.

There were six categories of response that merited marks:

Category A: correct identification of the 'general' option and the 'specific' option;

Category B: correct identification of the two appropriate options, but allocating the 'general' option to the 'specific' category, and vice versa;

Categories C and D: only one correct option identified, and that at the appropriate level of specificity;

Categories E and F: only one correct option identified, and that allocated to the wrong level of specificity.

Marks were allocated in two ways, one to probe the overall degree of comprehension, the other to probe the extent to which instantiation occurred at a high level of specificity:

Response category	Marks allocated:	
	to measure general comprehension	to measure the level at which instantiation occurs
A	3	6
B	3	3
C	2	2
D	2	2
E	1	1
F	1	1
Max. possible score	75	150

As can be seen, the first set makes no distinction over level of instantiation, and rewards equally Categories A and B, while the second set rewards specific instantiation, as manifested by Category A responses. Tests and texts were colour coded for ease of administration. The high difficulty texts were Red 1 and Blue 2; the low difficulty were Red 2 and Blue 1.

4.6.4 Subjects

Two S1 classes were used, with a normal ability range. Allowing for absences and incomplete responses, this meant an experimental population of 49.

4.6.5 Administration

The texts and tests were administered by the experimenter. The purpose of the experiment was explained briefly. Because the test was of a kind probably unfamiliar, it was briefly explained, with examples, from the blackboard. The unfamiliarity appeared to cause no difficulty. Text allocation was alternated to ensure balanced exposure to the four texts. (Sample administration instructions are shown at Appendix 12.)

4.6.6 Results

Two sets of scores are referred to: the 'general comprehension' score, obtained by making no distinction between the levels at which the correct response was instantiated; and the 'specific comprehension' score, obtained by rewarding the reader who appeared, from the assessment responses, to have stored the passage content at a specific level of instantiation (see 4.6.3 above). 'High difficulty' texts are those where the cues for instantiation are at a general level; in the 'low difficulty' texts the cues are at a more specific level. Overall scores were considered first:

Table 1: Mean scores

N=49	High difficulty		Low difficulty	
	General	Specific	General	Specific
	/75	/150	/75	/150
Mean	55.94	77.67	56.90	86.53
S.D.	9.77	18.04	11.20	25.51

There were no significant differences between general comprehension scores; specific comprehension scores were significantly higher for the low difficulty material.

Table 2. Analysis of Variance for the specific comprehension scores

Sources of variance.	Sums of squares	Degrees of freedom	Mean squares	F Ratio
Subjects	33665.98	48	701.37	
WITHIN SUBJECT VARIABLES				
Passage difficulty	1922.00	1	1922.00	6.99
Error (subjects x conditions)	13205.00	48	275.10	
Total	48792.98	97		

Probability = 0.01071

Overall scores were then considered by sex:

Table 3: Mean scores, by sex

N(boys)=23 N(girls)=26

		High difficulty		Low difficulty	
		General /75	Specific /150	General /75	Specific /150
Girls	Mean	54.81	76.23	57.62	89.35
	S.D.	9.75	18.31	11.91	26.56
Boys	Mean	57.26	79.30	56.09	83.35
	S.D.	9.89	18.00	10.55	24.48

There were no significant differences for boys or girls on general comprehension scores; specific comprehension scores on the low difficulty material were significantly higher for the girls.

Table 4. Analysis of Variance for high ability readers on specific comprehension scores

Sources of variance	Sums of squares	Degrees of freedom	Mean squares	F Ratio
Subjects	19790.17	25	791.61	
WITHIN SUBJECT VARIABLES				
Passage difficulty	2236.17	1	2236.17	8.99
Error (subjects x conditions)	6220.33	25	248.81	
Total	28246.67	51		

Probability = 0.00612

Scores were then considered by ability. Readers were ranked by their total general comprehension scores; the top and bottom ten scores were selected for comparison, drawing equally from both topics to avoid a topic effect.

Table 5: Mean scores by ability

(N=20)		High difficulty		Low difficulty	
		General /75	Specific /150	General /75	Specific /150
High	Mean	65.7	95.4	69.1	115.9
abil.	S.D.	5.01	12.35	4.07	13.14
Low	Mean	43.2	57.3	41.7	54.3
abil.	S.D.	6.39	12.03	6.43	11.37

For the less successful readers, passage difficulty caused no significant differences in general or specific comprehension scores. For the high ability readers, there were no significant differences on

general comprehension scores, but specific comprehension scores were significantly higher on the low difficulty material.

Table 6: Analysis of Variance for high ability readers on specific comprehension scores

Sources of variance	Sums of squares	Degrees of freedom	Mean squares	F Ratio
Subjects	614.05	9	68.23	
WITHIN SUBJECT VARIABLES				
Passage difficulty	2531.25	1	2531.25	7.92
Error (subjects x conditions)	2875.25	9	319.47	
Total	6020.55	19		

Probability = 0.01949

There was, further, a significant interaction between ability and text difficulty on the specific comprehension scores: mean scores for high ability pupils rose significantly on low difficulty material, while those of the low ability pupils fell a little.

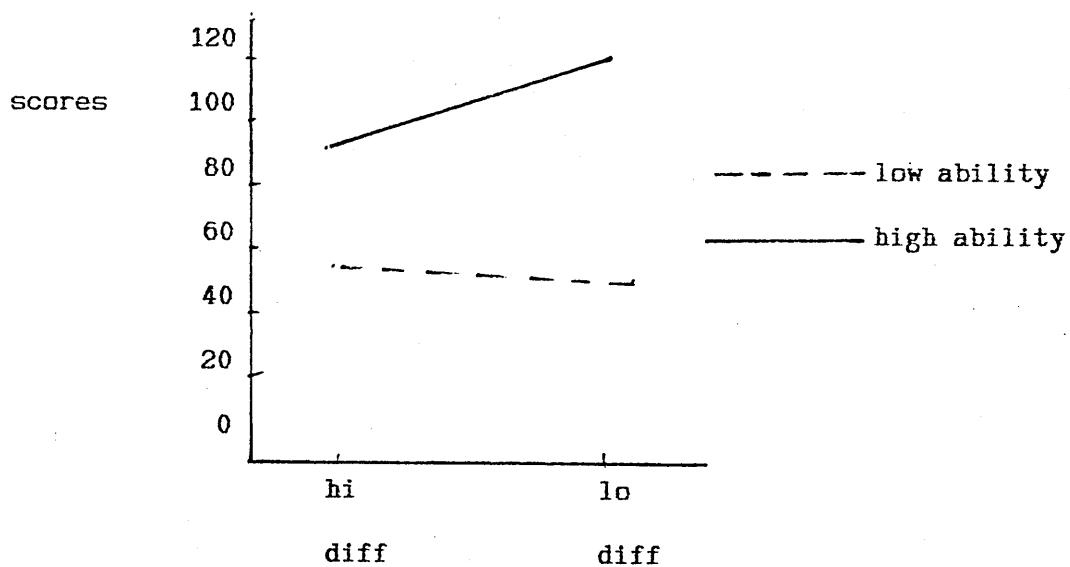


Table 7: Analysis of Variance for interaction between high and low ability readers on specific comprehension scores

Sources of variance	Sums of squares	Degrees of freedom	Mean squares	F Ratio
BETWEEN SUBJECT VARIABLES				
Ability	25857.22	1	25857.22	304.75
Error	1527.25	18	84.85	
WITHIN SUBJECT VARIABLES				
Passage difficulty	950.62	1	950.62	3.86
Interaction	1625.63	1	1625.63	6.61
Error	4428.25	18	246.01	
Total	34388.97	39		

Interaction Probability = 0.01832

4.6.7 Discussion

The hypotheses were only partly supported by the evidence collected.

Analysis of the overall scores showed that the level of general comprehension was unaffected by the instantiation demands in the text. It suggested, though, that readers did respond to the nature of the instantiation cues: given specific cues in the text, they tended to store the text content at a specific level of instantiation ($p=0.016$).

Hypothesis 1 predicted that the comprehension of successful readers would be unaffected by instantiation demands. This was true of their general comprehension, but not true of their specific comprehension:

they instantiated at a specific level only if the cues were presented at a specific level ($p=0.01949$).

Hypothesis 2 predicted that a text without specific instantiation would impede the comprehension of poorer readers. It did not, for general or specific comprehension, and the mean scores indicated a slight counter effect, with higher scores where instantiation cues were general rather than specific. This difference between the reactions of high and low ability readers towards the instantiation demands of the text was significant ($p=0.01832$).

This was unexpected; it may be that the processes of instantiation do not, as had been supposed, make significant cognitive demands; or it may be that the choice offered to the readers in the assessment was too subtle for less sensitive readers. There is another aspect of the assessment that must be considered: a reader with a 'photographic' memory would be at an advantage on 'low difficulty' passages, despite care taken to avoid structures and lexis in test items that reflected too closely the structure and lexis in the passages: the key word had to appear in both passage and test if its usage was to be probed, and this might aid certain processing styles, perhaps the styles favoured by abler readers. The high specific comprehension scores of able readers on the low difficulty texts, where specific cues were presented, lends support to such an idea.

Hypothesis 3 predicted a sex difference in pupil responses. This was confirmed, in that girls were significantly more likely to instantiate at a specific level when presented with cues at a specific level ($p=0.006$), while the instantiation level for boys was unaffected by the nature of the cues presented in the text.

4.6.8 Conclusions

The distinctions being probed in this study are subtle ones, and it is difficult to be completely confident of full validity of the measures used. However, the instruments seemed valid enough, and the results clear enough, to justify interest in the implications of the results: they imply that instantiation may not after all be a process that makes heavy cognitive demands; that high instantiation demands do not affect general comprehension; and that there is a sex difference and an ability difference in responses to instantiation demands, in that only girls and good readers store content at a more specific level when presented with more specific cues.

4.7 Study Seven

Focus: The comparative effect on comprehension of deductive and inductive paragraph organisation.

Theoretical context: If we use the kind of schematic model of reading that underpins these studies, it might be expected that both storage and retrieval of content would be facilitated by early statement of the main point in each paragraph. Arguably, such an early statement should provide the reader with a gist summary, by which the ensuing paragraph content can more easily be organised for storage; at the same time, it should provide a ready-made 'label', by which the content can be recognised and accessed for retrieval (Kieras 1978). The hypotheses are based upon this supposition: that texts with deductive paragraph organisation (i.e. initial statement of main point, followed by the supporting evidence), will be better processed than those with an inductive paragraph organisation (i.e. the supporting evidence followed by the main point), at least among those who are less successful with the material. Such readers might be expected to need this support. Those readers who are more successful with the material may not need this support to the same extent - indeed, it may be that some readers, of certain ability or cognitive style, are stimulated by the challenge of an inductive structure, and perform better with such structures.

4.7.1 Hypotheses

1. That deductive, rather than inductive, paragraph organisation facilitates storage and retrieval of passage content.
2. That this effect will be more marked among those readers who are less successful with the materials.
3. That there will be a sex difference in pupils' responses to paragraph organisation (this sex dimension was suggested by the results of Study 4.1, and is investigated in all subsequent studies).

4.7.2 Methods

Low and high difficulty texts were constructed, with deductive or inductive paragraph structures. Presentation of texts was alternated, to allow for the effects of practice and fatigue. The assessments were designed to probe ease of retrieval of content, and grasp of causal relationships within the passage.

4.7.3 Materials

High and low difficulty texts were constructed for two topics. Both were accounts of different aspects of life during the Second World War

Matching of texts between the High and Low difficulty versions within each topic was very close indeed:

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
text structure	identical
para organisation	the variable under investigation
given/ new	identical
'signal' words	identical
inferencing	included as part of the variable under investigation, as the differing paragraph structures would impose different inferencing demands
instantiation	identical
causal chain	identical
concreteness	identical
importance ranking	where there was a difference between the passages in the extent to which the relative importance of the passage elements was made clear, then this occurred in relation to the variable under investigation
lexical familiarity	identical
topic familiarity	identical
curriculum area	identical

Looking at the matching of the two topics, there were some identical features:

Variable, and degree of matching

passage length	identical
sentence length	identical

sentence numbers	identical
text structure	identical
para organisation	identical
curriculum area	identical

For other text features, perfect matching could not be achieved, but the use of the same template in generating material for the two topics ensured adequate matching in:

- the proportion of given/ new material,
- the role of 'signal' words,
- inferencing demands,
- instantiation demands,
- causal chain characteristics,
- concreteness,
- importance ranking.

The topics were closely related, and thus of probably similar familiarity; they were at a similar level of concreteness; and having been generated by the same writer, seeking a roughly equivalent lexical level, lexical familiarity was probably adequately matched.

Looking at inter-study comparability, curriculum area, topic and lexical familiarity and concreteness remain quite closely matched; beyond that, matching was less stringent.

(See Appendix 7 for passages)

The assessment was designed to probe two aspects of comprehension:

- (i) Firstly, whether the paragraph organisation affected accuracy of storage and retrieval of individual propositions from the passages; this was tested by means of the reader allocating statements to the

categories 'True/ False/ Not Enough Evidence'. Each correct allocation gained a mark, giving a maximum score of 21.

(ii) Secondly, whether storage and retrieval of the gist, with its overarching interrelationships, was affected by paragraph structure; this was probed by means of more continuous prose, with the reader having to rank for fidelity five summaries, one of which was correct, the others containing various numbers of mistakes. Each correct allocation gained a mark, giving a maximum score of 5.

Tests and texts were colour coded for ease of administration:

Battle of Britain	Low difficulty	Red 2
Battle of Britain	High difficulty	Red 1
Daily Life at Home	High difficulty	Blue 2
Daily Life at Home	Low difficulty	Blue 1

(See Appendix 7 for tests and answer forms)

4.7.4 Subjects

Two S1 classes were used, with a normal ability range. Allowing for absences, and incomplete responses, this gave an experimental population of 54.

4.7.5 Administration

The texts and tests were administered by the experimenter. The purpose of the experiment was explained briefly, and examples of the test questions explained from the blackboard. Text allocation was

alternated, to ensure balanced exposure to the four texts, and avoid a practise or fatigue effect.

(See Appendix 12 for sample administration instructions)

3.7.6 Results

The mean scores showed no significant differences between the high and the low difficulty materials:

TABLE 1: Mean scores

N=54	High difficulty			Low difficulty		
	A	B	Total	A	B	Total
	(/21)	(/5)	(/26)	(/21)	(/5)	(/26)
Mean	11.63	2.41	14.04	13.02	2.02	15.04
SD	3.50	1.85	4.54	3.23	1.79	4.12

From these results, it can be seen that Part A of the tests, where readers allocated statements to categories True/ False/ Not Enough Evidence, discriminated most effectively between readers. Reader responses to Part B, the ranking of summaries according to their accuracy, gave the impression of relying on guesswork, and did not discriminate well between readers. The differences fell short of statistical significance.

The results were then considered by topic, to see if one of the topics discriminated more effectively than the other:

TABLE 2: Mean scores from "The Battle of Britain"

		Part A (/21)	Part B (/5)
High	mean	10.10	1.93
	SD	2.38	1.53
Low	mean	12.16	1.76
	SD	3.92	1.51

TABLE 3: Mean scores from "Daily Life at Home"

		Part A (/21)	Part B (/5)
High	mean	13.4	2.96
	SD	3.80	2.05
Low	mean	13.75	2.24
	SD	2.31	1.99

As can be seen, the "The Battle of Britain" texts and test were the more effective discriminator. A one way unrelated/ random analysis of variance showed a significant difference between high and low difficulty scores of Part A of the test ($p=0.0208$)

TABLE 4: Analysis of Variance for the 'Battle of Britain' scores

Sources of Variance	Sums of Squares	Degrees of freedom	Mean Squares	F Ratio
paragraph structure	56.7837	1	56.7837	5.592 ($p=0.0208$)
Error	528.0497	52	10.1548	
Total	584.8333	53		

The results by sex came close to statistical significance in favour of the girls ($p=0.0504$):

TABLE 5: Part A mean scores, by sex

N(girls)=26 (/21)

N(boys) =28		High difficulty	Low difficulty
Girls	Mean	11.27	13.19
	SD	3.65	2.45
Boys	Mean	11.96	12.86
	SD	3.39	3.86

Considering the scores from "The Battle of Britain" only, one way unrelated/ random analysis of variance showed that the difference between the girls scores was significant ($p=0.0310$)

TABLE 6: Mean scores, by sex, for "The Battle of Britain" Pt.A

(/21)		High difficulty	Low difficulty
Girls	Mean	9.31	11.7
	SD	2.52	2.75
Boys	Mean	11.08	12.47
	SD	1.85	4.61

TABLE 7: Analysis of Variance for Part A scores by sex, in 'The Battle of Britain'

Sources of Variance	Sums of Squares	Degrees of freedom	Mean Squares	F Ratio
paragraph structure	35.07788	1	35.07788	5.1479 ($p=0.0310$)
Error	163.5375	24	6.81406	
Total	198.6154	25		

The results were then considered by ability. Ability was judged by ranking each pupil's total Part A scores. The top and bottom ten scores were taken (5 from each topic, to counter any topic effect in the scores).

TABLE 8: Mean scores, for both topics, by ability

N=20 (/21)

		High difficulty	Low difficulty
High ability	Mean	14.9	17.1
	SD	2.23	1.45
Low ability	Mean	8.2	8.8
	SD	2.53	2.53

There were no differences worth pursuing among the less able readers. Analysis of variance showed the difference between the high and low difficulty scores of the able readers to be statistically significant ($p=0.0170$).

TABLE 9: Analysis of Variance for scores of able readers

Sources of Variance	Sums of Squares	Degrees of freedom	Mean Squares	F Ratio
paragraph structure	24.2	1	24.2	8.44186 ($p=0.0170$)
Subjects	38.0	9	4.22222	1.47287
Error	25.8	9	2.86667	
Total	88.0	19		

4.7.7 Discussion

As explained, Part B results were judged to be poor discriminators: the task was perhaps too difficult, and pupil responses perhaps relied too heavily on guesswork. Accordingly, they were discarded; in this discussion, results refer to Part A scores.

These results tended to support the supposition upon which the first hypothesis was based: that deductive paragraph structures, where

the main point opens each paragraph, are more easily processed than inductive structures, where the main point closes the paragraph. This effect was not statistically significant when overall results were considered; it became significant, however, when "The Battle of Britain" results, the topic that discriminated more effectively, were considered alone. Early statement of the main point in each paragraph appeared to facilitate comprehension.

Hypothesis 2 was reversed by the results. Instead of the effect being more marked among less successful readers, it was scarcely noticeable among them; among the more successful readers, it was a marked effect, and clearly significant. Poorer readers, then, did not seem much affected by the paragraph structure in these texts, but those who coped well with the material did gain significantly higher scores on the low difficulty materials.

Hypothesis 3 was supported, in that while neither sex did noticeably better than the other, the different paragraph structures seemed to affect girls more than boys. Boys were relatively unaffected by the location of the main point in each paragraph, but girls did better with the low difficulty materials, where the main point opened the paragraph. The effect fell just short of significance when overall scores were considered, but was statistically significant when the "Battle of Britain" scores were analysed on their own.

4.7.8 Conclusions

In interpreting these results, and all the others in the whole sequence of studies, there is an important qualification to make: where

results indicate that low ability pupils are not helped by a certain text feature, it does not mean that they are unable to make use of it - it simply tells us that they appeared to find it less helpful, in that experimental text on that occasion. They were the pupils who found the material difficult, and it may well be that although a reader did not make use of a certain text feature while processing this difficult material, he or she might make competent use of that feature when dealing with less demanding text. At best, the ability results in these studies can do no more than indicate which text features may or may not help a less skilled reader when the going gets rough. They tell us nothing at all about how that reader might behave with simpler text.

That being said, this study suggests that readers who are coping adequately with text are helped by paragraph organisation that presents the main point at the beginning. Those who are struggling seem unable to make use of this feature. Similarly, girls seemed more likely than boys to make use of the feature.

4.8 Study Eight

Focus: the effect upon comprehension of changed causal chain characteristics

Theoretical context: Trabasso, Secco, and van den Broek (1984)

suggested that narrative at least can be represented through causal chains, and that the greater the proportion of events lying on the causal chain, the more coherent is the story, and the more memorable. The concern here is whether causal chain characteristics affect comprehension of the kinds of expository texts dealt with in these studies.

A 'setting statement' evokes a causal field; as the facts are established, they are ordered into a causal chain. Given a new event, expectations are instantiated by backward inference to the event causally prior to it. This process continues as long as expectations continue, and are instantiated. When there are no new expectations, the causal field closes. Events may be on a chain, or on a dead end, and the comprehender, they found, seemed to edit representation so that the dead end events were not recalled.

For example, in these sentences, sentences 1 to 4 constitute one causal field, with all the events lying on the causal chain. The first sentence evokes the causal field, and the fourth closes it, with the fifth apparently evoking a new causal field:

1. The girl turned and looked behind her.
2. She could just see her brother in the distance.
3. He was going very slowly, and seemed to be limping.
4. She settled down to wait.

5. It was colder now, and it would soon be dark....

Had it read as follows, the causal structure would remain the same, except that Sentence 2 would not lie on the causal chain; it would be a dead end event:

1. The girl turned and looked behind her.
2. A lonely blackbird was singing softly in a branch
above her head.
3. She could just see her brother in the distance.
4. She settled down to wait.
5. It was colder now, and it would soon be dark....

This study seeks to extend the question beyond narrative, to consider the effect of causal chain characteristics upon the reader of expository text. The supposition is that dead end events will not be well processed, thus not readily retrieved; and that the presence of dead end events, by disrupting the continuity of the causal chain, impedes the processing of the events that are on the causal chain. The hypotheses are based on these assumptions.

4.8.1 Hypotheses

1. That the presence of dead end events in the causal chain of a text impedes the processing of the events that lie on the causal chain.
2. That dead end events are less well recalled than the parallel insignificant events that are on the causal chain.

3. That less successful readers will not be affected in the same way as successful readers by changes in causal chain characteristics.
4. That there will be a sex difference in pupil responses to causal chain characteristics (this sex dimension was suggested by the results of Study 4.1, and is investigated in all subsequent studies).

4.8.2 Methods

Low and high difficulty texts were constructed, with the high difficulty texts featuring dead end events; the low difficulty texts featured, in place of the dead end events, propositions of low significance that remained firmly on the causal chain. Each pupil read one high difficulty passage, and one low difficulty passage; the pupil was assessed immediately after each reading, and did not have access to the passage during assessment.

4.8.3 Materials

High and low difficulty texts were constructed for two topics. Both topics dealt with hazardous journeys/ activities. The high and low difficulty versions in each topic had the same number of causal fields, and the same number of significant events on the causal chain. The high difficulty versions featured two dead end events in each causal field, while in the low difficulty versions these were replaced by less significant events that were on the causal chain.

Each text had a short introduction, followed by seven paragraphs, each forming a causal field. Each paragraph was structured as follows:

- setting statement / first significant point
- second significant point
- main point
- third significant point
- fourth significant point
- then, depending upon whether it was the high difficulty or the low difficulty version of the passage, a dead end point or minor causal chain point was inserted, one before the main point, and another after.

Matching of texts between the High and Low difficulty versions was very close indeed:

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
text structure	identical
text/ para organisation	identical
given/ new	identical, except that the propositions inserted into the high difficulty versions as dead end points represented completely new ideas, while the parallel minor causal chain points in the low difficulty versions tended to be existing inferences made explicit and perhaps expanded upon.
'signal' words	identical
inferencing	identical, except that a small number of inferences were made explicit in the low difficulty versions that were left, in the high difficulty versions, for the reader to infer if he wished to (see "Given/New" above).
instantiation	identical

causal chain	the variable under investigation
concreteness	identical, except where there might be variations in the propositions inserted as dead ends and parallel minor causal chain points.
importance ranking	identical, except where there might be variations in the propositions inserted as dead ends and parallel minor causal chain points.
lexical familiarity	identical, except where there might be variations in the propositions inserted as dead ends and parallel minor causal chain points.
topic familiarity	identical
curriculum area	identical

Looking at the matching of the two topics, there were some identical features:

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
text structure	identical
text/ para organisation	identical

For other text features, perfect matching between topics could not be achieved, but the use of the same template in generating material for the two topics ensured apparently adequate matching in:

- the proportion of given/ new material
- the role of signal words
- inferencing demands
- instantiation demands
- importance ranking

While there seems no way of comparing objectively the 'concreteness' of two passages, subjective scrutiny reveals no obvious mismatches.

Similarly, subjective judgement suggests a fair match both in topic familiarity and in curriculum area; and, the two topics having been generated by the same writer, seeking a roughly equivalent lexical level, lexical familiarity was probably adequately matched.

Looking at inter-study comparability, the 'balanced' paragraph structure (Bissex, in Gilliland 1975) reflected closely the structures used in Studies 2 and 3. Curriculum area, and topic and lexical familiarity remain quite closely matched; beyond that, matching was less stringent.

(See Appendix 8 for passages)

The assessment was in three parts:

- Parts A and B were designed to probe whether the presence of dead end events in the causal chain of a text impeded the processing of the events that lie on the causal chain. They probed only the significant events that lay on the causal chain, ignoring those propositions, either dead end events or minor causal chain points, that had been inserted to distinguish between the high and low difficulty passages. Part A involved allocating statements to the categories of True, False, or Not Enough Evidence, and Part B used four option multiple choice.
- Part C was designed to probe whether dead end events were less well recalled than the parallel minor events that were on the causal chain. It involved a jumbled list of near-verbatim statements of the dead end events and the minor causal chain points; the reader had to indicate which statements had been in the passage just read.

Part A was scored by giving one mark to each correct allocation (maximum score 21).

In Part B, one mark was given to each correct selection (maximum score 10).

In Part C, one mark was given for each correct identification, (allowing a maximum of ten), and one mark detracted for each incorrect identification. To counter the negative scores that could thus be encountered (the highest negative score actually encountered was -5), the base line was a score of five, allowing an adjusted maximum score of fifteen.

(See Appendix 8 for the tests)

4.8.4 Subjects

Two normal S1 classes were used, representing a wide range of ability. Allowing for absences, and for one response that was rejected on the grounds that the pupil concerned gave inadequate attention to one of the passages, this gave an experimental population of 59.

4.8.5 Administration

The texts and tests were administered by the experimenter. The purpose of the experiment was explained briefly, and examples of test questions explained from the blackboard. Text allocation was alternated, to ensure balanced exposure to the four texts, and avoid a practice or fatigue effect.

The tests and texts were colour coded for ease of administrations:

California or Bust High Difficulty version Red 1
 California or Bust Low Difficulty version Red 2
 At War with the Sea High Difficulty version Blue 2
 At War with the Sea Low Difficulty version Blue 1
 (See Appendix 12 for sample administration instructions)

4.8.6 Results

Overall mean scores are shown in Table 1:

TABLE 1: Mean Scores

N=59	Lo difficulty				High difficulty			
	Pt.A	Pt.B	A+B	Pt.C	Pt.A	Pt.B	A+B	Pt.C
	/21	/10	/31	/15	/21	/10	/31	/15
Mean	12.51	5.93	18.44	9.32	11.74	6.25	17.80	7.37
SD	4.21	2.88	6.73	3.43	3.61	2.56	5.35	3.01

There were no differences in mean scores between the high and low difficulty material for Parts A and B of the tests (those parts probing retention of significant points that lay on the causal chain). One-way related (fixed) analysis of variance showed that the Part C mean score was significantly lower for the high difficulty material, indicating poorer retention of dead end propositions ($p=0.0002$).

TABLE 2: Analysis of Variance for Part C scores

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratio	Probability
Hi/Lo difficulty	112.076	1	112.076	17.132	0.0002
Subjects	829.254	58	14.298	2.186	0.0017
Error	379.424	58	6.542		
Total	1320.75	117			

The results were then considered by topic.

TABLE 3: Mean Scores for 'At War with the Sea'

N=59	Lo difficulty			High difficulty		
	Pt.A	Pt.B	Pt.C	Pt.A	Pt.B	Pt.C
	/21	/10	/15	/21	/10	/15
Mean	12.53	5.94	9.15	12.28	6	7.72
SD	4.32	2.81	3.81	3.94	2.33	3.16

TABLE 4: Mean Scores for 'California or Bust'

N=59	Lo difficulty			High difficulty		
	Pt.A	Pt.B	Pt.C	Pt.A	Pt.B	Pt.C
	/21	/10	/15	/21	/10	/15
Mean	12.48	5.92	9.56	11.35	6.44	7.11
SD	4.16	3.03	2.89	3.36	2.74	2.92

The scores showed that the materials were well matched for difficulty, and that both texts discriminated between readers to a similar extent. Nothing would be gained by using an unrelated/ random statistical design to consider these results any further.

Table 5, below, shows means scores by sex.

TABLE 5: Mean scores by sex.

N(boys)=26 N(girls)=33

		Lo difficulty			High difficulty		
		Pt.A	Pt.B	Pt.C	Pt.A	Pt.B	Pt.C
		/21	/10	/15	/21	/10	/15
Boys	Mean	12	5.69	8.77	11.53	6.35	7.27
	SD	4.36	2.74	3.56	3.38	2.56	2.91
Girls	Mean	12.91	6.12	9.76	11.91	6.18	7.45
	SD	4.12	3.01	3.32	3.83	2.60	3.13

As with all the other scores, there were no differences worth noting among the results for Parts A and B. The difference between boys' scores

on the Part C material fell short of significance, but showed a high degree of significance for the girls ($p=0.0003$), using a one way related/ fixed analysis of variance.

TABLE 6: Analysis of Variance for girls' scores on Part C material

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratio	Probability
Hi/Lo difficulty	87.515	1	87.515	17.560	0.0003
Subjects	506.76	32	15.836	3.177	0.0008
Error	159.48	32	4.984		
Total	753.76	65			

The results were then considered by ability. Ability was judged by ranking the total A and B scores for each pupil, across the high and low difficulty materials. The top and bottom ten scores were taken (5 from each topic, to counter any topic effect in the scores).

TABLE 7: Mean scores by ability.

N=20

		Lo difficulty			High difficulty		
		Pt.A /21	Pt.B /10	Pt.C /15	Pt.A /21	Pt.B /10	Pt.C /15
High ab.	Mean	16.9	9.1	13.2	15.3	9	9.5
	SD	1.66	1.10	0.92	2.26	1.05	1.90
Low ab.	Mean	6.9	2.7	5.7	6.8	3.5	7.4
	SD	2.08	1.34	2.45	1.75	2.07	2.95

Analysis by one way related/ fixed analysis of variance, of the Part C results, showed that the high ability readers did significantly better on the low difficulty material than on the high difficulty material ($p=0.0006$).

TABLE 8: Analysis of Variance of scores of high ability readers on
Part C material

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratio	Probability
Hi/Lo difficulty	68.45	1	68.45	27.939	0.0006
Subjects	18.05	9	2.0056	0.8186	0.6151
Error	22.05	9	2.45		
Total	108.55	19			

Similar analysis of the Part C results of the low ability readers showed an opposite effect, readers doing significantly better on the high difficulty material ($p=0.0136$).

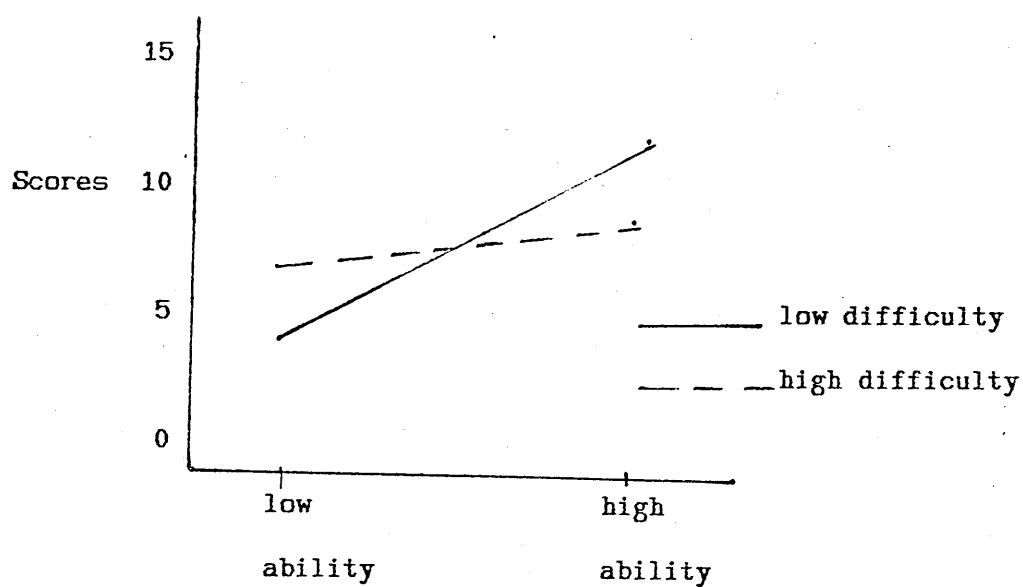
TABLE 9: Analysis of Variance of scores of low ability readers on
Part C material

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratio	Probability
Hi/Lo difficulty	14.45	1	14.45	9.2652	0.0136
Subjects	120.45	9	13.38	8.573	0.0022
Error	14.05	9	1.561		
Total	148.95	19			

Analysis of the interaction, using a mixed design, showed the interaction to be significant ($p=0.03652$):

TABLE 10: Analysis of Variance for the interaction between high and low ability readers on the Part C material

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratio	Probability
BETWEEN SUBJECT VARIABLES					
Hi/Lo ab.	230.4	1	230.4	29.94	0.00011
Error	138.5	18	7.694		
WITHIN SUBJECT VARIABLES					
hi/lo difficulty	10	1	10	4.99	0.03652
Interaction	72.9	1	72.9	36.35	0.00006
Error	36.1	18	2.006		
Total	487.9	39			



4.8.7 Discussion

Parts A and B of the assessment were aimed at probing readers' comprehension of those events, common to high and low difficulty versions, that lay on the causal chain. The results showed, quite

clearly, that the presence of dead end events appeared to make no difference to the processing of the events on the causal chain. This remained consistent across all the analyses carried out, by overall results, by topic, by sex, and by ability. There was, then, no evidence to support Hypothesis 1.

Hypothesis 2 predicted that the dead end events in the high difficulty versions would be less well recalled than the insignificant/minor causal chain points that replaced them in the low difficulty versions. This was probed by Part C of the assessment, where readers were confronted by a jumbled list of the relevant statements, in near verbatim form, and had to indicate which of them they had read.

The results were interesting. Taking the overall results, there was strikingly significant evidence ($p=0.0002$) in support of the hypothesis (so striking, in fact, that the analyses were re-run several times to confirm them): in general, readers were less successful in recognising the dead end statements. This suggests that the effect found by Trabasso et al (1984), for narrative text, applies also to expository text of this kind.

The same trend was apparent when the results were analysed by topic, and by sex: readers were less successful with dead end statements. There was a nod in the direction of Hypothesis 4, though no more than a nod, in that girls' scores on the high difficulty material were significantly lower ($p=0.0003$), while the difference for boys was in the same direction, but fell short of significance. The evidence is far too inconclusive to suggest that any important sex difference exists.

When the Part C results were analysed by ability, however, there emerged clear suggestions that there were differences in the ways in which successful and less successful readers processed these texts: the successful readers conformed to the pattern, with very significantly lower scores on the high difficulty material ($p=0.0006$), while the less successful readers showed significantly higher scores on the high difficulty material ($p=0.0136$). The unsuccessful readers were more likely to remember the dead end statements. This interaction between reader skill and causal chain characteristics was a significant one ($p=0.03652$).

What might account for these results? The schema theory of reading which underpins these studies can account for the difficulty with dead end material: if the reader uses the frameworks provided by existing schemas/ knowledge structures to construct an ongoing gist summary of text content, peripheral material will take low priority. Dead end propositions, then, not being needed in this process of ongoing summary, are more likely to be forgotten. Minor propositions on the causal chain, however, are likely to be recalled for two reasons: firstly, they form part of the material from which the gist summary has been constructed; and secondly, by their very nature as causal chain propositions, they may be accessed not through 'recognition' as such, but through inference. These minor causal chain points tended to be implicit inferences, made explicit in the low difficulty passages. Dead end propositions could not be accessed in either of these ways.

The reverse effect, by which less successful readers found the dead end material easier to recognise, may be accounted for by what Sanford and Garrod call the 'weird list', the memorable misfits (1981), or Graesser's 'tags' (1981): material stands out in the reader's mind

simply on the grounds that it is deviant. It attracts notice because it tallies ill with the contents of the schemas in use. It seems plausible to argue that for these readers, who were presumably not coping well with constructing their own ongoing summary of the text, the deviant material might be more memorable than the non-deviant. It would be interesting to analyse Trabasso's results (1984) by ability, to see if this effect appeared when narrative text was processed.

4.8.8 Conclusions

The results seem consistent and clear. They suggest that, in these texts, the presence of dead end material did not impede the processing of the important ideas that lay on the causal chain. There was clear evidence that dead end material was less well recalled than causal chain material, except among unsuccessful readers, who appeared to find dead end material relatively more memorable.

4.9 Study Five

Focus: the effect upon comprehension of a lack of topic concreteness/
imageability

Theoretical context: the hypotheses in this study are based upon the supposition that it is easier to process text if it deals with concrete rather than abstract concepts.

4.9.1 Hypotheses

1. That abstract concepts will be less effectively recalled than concrete concepts.
2. That this phenomenon will be specially marked among less able readers.
3. That there will be a sex difference in pupils' responses to changing levels of concept concreteness in text. (This sex dimension was suggested by the results of Study 4.1, and is investigated in all subsequent studies.)

4.9.2 Methods

Low and high difficulty texts were constructed; the high difficulty texts dealt with abstract concepts (obedience and trust), while the low difficulty texts dealt with concrete concepts (weaving cloth and building bridges). Each pupil read one high difficulty passage, and one

low difficulty passage; the pupil was assessed immediately after each reading, and did not have access to the passage during assessment.

4.9.3 Materials

The hypotheses were based on the supposition that concrete concepts would be processed more easily than abstract ones; thus the texts needed to vary in the extent to which they were concrete. This meant a change in experimental materials, and perhaps a weaker experimental design: in all earlier studies, the same content was being assessed in the high and the low difficulty versions, the interest being in how comprehension had been affected by varying such text features as paragraph structure and instantiation demands. Such variables could be manipulated without changing passage content between the high and low difficulty versions, so allowing a very close match between high and low difficulty versions of each topic. In this study, however, it was the nature of the content itself that was the manipulated variable, and this inevitably affected matching. There were two topics, each dealing with hypothetical groups of people, the Kungus of Central Africa and the Potols of Central America. The low difficulty versions (concrete concepts) dealt with the development of an artefact in each group (the vine suspension bridges of the Kungus and the woven fabrics of the Potols); the high difficulty versions (abstract concepts) dealt with development of a human quality valued by each group (trust and teamwork among the Kungus and obedience among the Potols).

The structure for each passage was as follows:

- the setting, and a description of the group (common to high and low difficulty versions)
- what it was the group valued
- why this was valued
- the conditions or materials needed for its development
- a description of the process by which it was developed
- a description of the end result

Matching of texts was identical for some features:

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence numbers	identical
text structure	identical
text/ para organisation	
	identical

For other text features, perfect matching could not be achieved, but the use of the same template in generating material ensured apparently adequate matching in:

- the proportion of given/ new material
- the role of 'signal' words
- inferencing demands
- instantiation demands
- causal chain characteristics
- importance ranking

'Concreteness' was the manipulated variable; subjective scrutiny suggests that lexical familiarity, topic familiarity, and curriculum area were probably adequately matched.

Looking at inter-study comparability, curriculum area, topic and lexical familiarity remain similar to preceding studies; beyond that, matching was less stringent.

(See Appendix 9 for passages)

Assessment, too, was different for this study: there were four separate texts, rather than two texts with two variants each, so there was a need for four tests, instead of the usual two. Thus test matching was more critical than in earlier studies. It seemed that matching of tests would be harder if any kind of closed choice testing was used, since all the options would need to be matched; accordingly, in this study, open ended techniques were used, and the loss of precision in scoring was accepted. Part 1 of the test used open ended questions, with parallel features being probed for each passage. Part 2 used unstructured free recall, by asking readers to summarise for the benefit of another person. (Such unstructured free recall has serious limitations when the scores of different pupils are being compared, since there may be differences in the ways in which pupils would interpret an instruction to tell someone 'all the important things that happened in the passage'. But in this case the focus was upon the differences between the high and low difficulty scores of each pupil, so interpretation of the results was not constrained in this way).

(See Appendix 9 for tests)

4.9.4 Subjects

Two normal S1 classes were used, representing a wide range of ability. This gave an experimental population of 50.

4.9.5 Administration

The texts and tests were administered by the experimenter. The purpose of the experiment was explained briefly. Text allocation was alternated, to ensure a balanced exposure to the four texts, and to avoid a practice or a fatigue effect. The tests and texts were colour coded for ease of administration:

The Potol Warriors of Central America high difficulty Red 1
The Crafts of the Potols low difficulty Red 2
The Tiny Hunters of the Jungle high difficulty Blue 2
Builders in the Jungle low difficulty Blue 1
(See Appendix 12 for sample administration instructions)

4.9.6 Results

Overall mean scores are shown in Table 1:

Table 1: Mean scores

N=50	Low difficulty			High difficulty		
	Pt.1	Pt.2	Pts.1+2	Pt.1	Pt.2	Pts.1+2
	/6	/13	/19	/6	/13	/19
Mean	4.26	3.58	7.84	4.34	3.84	8.16
SD	1.32	2.16	2.82	1.67	2.32	3.28

There were no significant differences between mean scores for high and low difficulty material.

Total results were then considered by topic, to ensure that no single text stood out as having been too hard or easy. As can be seen from Table 2, the topics were well matched for difficulty, and there appeared to be nothing to be gained by further analysis by topic using unrelated/ random statistical design.

Table 2: Mean scores by topic

N=50		Low difficulty Pts.1+2 /19	High difficulty Pts.1+2 /19
Potol passages	Mean	(Crafts) 7.16	(Warriors) 8.12
	SD	2.57	3.17
Kungu passages	Mean	(Builders) 8.46	(Hunters) 8.21
	SD	2.94	3.48

Consideration of mean scores by sex showed no significant differences:

Table 3: Mean scores by sex

N(boys)=26		Low difficulty		High difficulty	
N(girls)=24		Pt.1 /6	Pt.2 /13	Pt.1 /6	Pt.2 /13
Boys	Mean	4.23	3.15	4.46	3.50
	SD	1.50	2.03	1.68	2.34
Girls	Mean	4.29	4.04	4.21	4.21
	SD	1.12	2.24	1.69	2.30

Finally, the results were considered by ability. Ability was judged by ranking the overall total score for each pupil, across the high and low difficulty materials. The top and bottom 10 scores were taken (5 from each topic, to counter any topic effect in the scores).

Table 4: Mean scores by ability

N=20		Low difficulty		High difficulty	
		Pt.1	Pt.2	Pt.1	Pt.2
		/6	/13	/6	/13
Low ability	Mean	3.5	1.5	2.5	1.3
	SD	1.78	1.08	1.72	0.95
High ability	Mean	5.1	5.7	5.2	6.9
	SD	0.74	2.67	0.92	1.97

None of these differences was significant.

4.9.7 Discussion

The results were counter-intuitive, in that they showed scores that were relatively uniform across high and low difficulty materials: there was no indication that topic concreteness played any part in how these passages were processed. Yet there was no doubt that there were real differences in the manipulated variable: a bridge is indubitably more 'concrete' than trust and teamwork, yet scores suggested little difference in processing difficulty. It may be that there was another factor involved, acting as a confounding variable, in this study and perhaps in other studies of concept concreteness: that of reader interest. There were recurrent nudging doubts during passage construction - the two 'abstract' passages did seem the rather more interesting. It may be that the dimensions of concreteness and reader

interest are closely linked, and that when concrete concepts are better grasped it is, in part, for no more esoteric reason than reader interest. Related to this idea are those of Meyer (1984) and Trabasso et al (1984): that well recalled events are those 'most conducive to imagery'. The scenes evoked in the 'abstract' passages were highly imageable, and this may have countered any effect due to their abstraction.

4.9.8 Conclusions

The results gave no indication that concept concreteness had affected processing in any way.

4.10 Study Ten

Focus: the effect upon comprehension of making explicit the distinction between essential and non-essential information, by means of an initial gist summary.

Theoretical context: the model of comprehension that underpins these studies suggests that the reader monitors incoming text for elements that will act as triggers to bring forward an appropriate schema; once such an appropriate schema is in place, primary processing controls comprehension (Sanford and Garrod 1981). This primary processing is rapid and relatively automatic, relying on the default values of the schema. The extent to which these default values may be used presumably controls the extent to which the primary processing is automatic: if the extent to which the default values may be used is relatively limited, and there are many slots to be filled with specific items of text content, then the processing, albeit primary, will demand relatively more attention. Where the schema becomes actually inappropriate, rather than merely bare, an alternative has to be sought, one which better matches the incoming text. This schema search is known as secondary processing, and may be quite demanding of cognitive resources. Once the new, appropriate schema is in place, processing returns to the less demanding primary mode.

Secondary processing thus makes greater demands upon the reader's cognitive resources than does primary processing, and any text feature that lessens these demands might be expected to facilitate processing. Such a feature would need to aid the reader both in selecting appropriate schemas, and in organising their

inter-relationships in such a way that they equip the reader with, at any one moment, an optimal working model of the text.

Explicit statement of which text elements are essential, and guidance about the inter-relationships between these elements, might be expected to provide such help. Such a statement might equate to the kind of gist summary that readers construct as they read, and that they use when they store text content for subsequent retrieval (Kintsch 1982, Fischer and Mandl 1984). Such a gist summary would provide both the gist of the passage's macropropositions and an outline of the passage's top level rhetorical structure, what Meyer (1984) has called a 'schematic superstructure'. Such a gist summary could be provided in a number of ways: through sub-headings, or in prose form at the beginning or end of the passage, or each paragraph. Most of these devices did not suit this study, and were rejected: sub-heading broke the pattern of continuous prose used in all preceding studies; gist summary at the beginning or end of each paragraph paralleled too closely the placing of the macroproposition that was investigated in Study 7; and a gist summary placed at the end of a passage seemed too close to the existing convention of repeating the main points at the end of a passage, as well as failing to provide the reader with help at the moment it is needed - before or during reading, rather than after reading. Accordingly, it was decided to provide the gist summary at the beginning of the passage. The hypotheses are based on the supposition that this would help the reader identify essential information, thereby helping in the process of schema selection and organisation. This, in its turn, would aid comprehension.

4.10.1 Hypotheses

1. That a gist summary at the start of a passage facilitates processing.
2. That less successful readers will be less supported by the presence of such a gist summary.
3. That there will be a sex difference in pupil responses to such a gist summary (this sex dimension was suggested by the results of Study 4.1, and is investigated in all subsequent studies).

4.10.2 Methods

Low and high difficulty texts were constructed, identical except that the low difficulty texts opened with a gist summary of the passage; this gist summary was omitted in the high difficulty versions. Each pupil read one high difficulty passage and one low difficulty passage; the pupil was assessed immediately after each reading, and did not have access to the passage during assessment.

4.10.3 Materials

High and low difficulty texts were constructed for two topics. Both topics dealt with the development of an imaginary socio-geographical phenomenon in the development of the United States: a market town in the new west, and an army camp on the Oregon trail. The low difficulty versions were preceded by a gist summary of the main ideas and their

inter-relationships; this was omitted in the high difficulty versions.

Each text followed the same structure:

- outline sketch of the development
- site before growth started
- first main factor, preceded by its two contributory factors
- second main factor, preceded by its two contributory factors
- third main factor, preceded by its two contributory factors
- fourth main factor, preceded by its two contributory factors
- how the factors combined to give rise to the development
- fuller description of the development

Signal words were not used to make explicit the main causal relationships in the texts, as they were fairly obvious : the relationships were, however, made explicit in the gist summaries provided in the low difficulty versions.

Matching of texts between the high and low difficulty versions was very close indeed:

Variable, and degree of matching

passage length	identical, except for the gist summaries prefixing the low difficulty versions
sentence length	identical
sentence numbers	identical, except for the gist summaries prefixing the low difficulty versions
text structure	identical
text/ para organisation	identical, except for the gist summaries prefixing the low difficulty versions
given/ new	identical

'signal' words	identical
inferencing	identical, except that the gist summaries prefixing the low difficulty versions made explicit certain causal inferences that were left implicit in the high difficulty versions.
instantiation	identical
causal chain	identical
concreteness	identical
importance ranking	identical, except that the gist summaries prefixing the low difficulty versions indicated to the reader which text elements were most significant
lexical familiarity	identical
topic familiarity	identical
curriculum area	identical

Looking at the matching of the two topics, there were some identical features:

Variable, and degree of matching

passage length	identical
sentence length	identical
sentence number	identical
text structure	identical
text/ para organisation	identical

For other text features, perfect matching between topics could not be achieved, but the use of the same template in generating material for the two topics ensured a high degree of similarity in:

- the proportion of given/ new material
- the role of 'signal' words

- inferencing demands
- instantiation demands
- causal chain characteristics.

While there seems no way of judging objectively the 'concreteness' of the two passages, subjective scrutiny shows no obvious mismatches. Similarly, subjective judgement suggests a fair match in lexical familiarity, topic familiarity, and curriculum area.

Looking at inter-study comparability, curriculum area, topic and lexical familiarity remain similar to preceding studies; beyond that, matching was less close.

(See Appendix 10 for passages)

Assessment sought to probe the texts' content and relationships.

Four option multiple choice was used, with:

- one correct response;
- two decoys that drew upon propositions, syntax and lexis the reader might recognise from the passage, but that were incorrect;
- and one decoy that did not draw upon the passage.

(see Appendix 10 for the tests)

4.10.4 Subjects

Two normal S1 classes were used, representing a wide range of ability. This gave an experimental population of 50.

4.10.5 Administration

The tests and texts were administered by the experimenter. The purpose of the experiment was explained briefly. Text allocation was alternated, to ensure a balanced exposure to the four texts, and avoid a practice or fatigue effect. The texts and tests were colour coded for ease of administration:

Samson Creek Low difficulty Red 1
Samson Creek High difficulty Red 2
Fort Judge Low difficulty Blue 2
Fort Judge High difficulty Blue 1

4.10.6 Results

Overall mean scores are shown in Table 1.

Table 1: Mean scores

N=50	Low difficulty	High difficulty
	/21	/21
Mean	10.74	11.38
SD	4.58	5.16

The difference in mean scores was not significant.

The results were then considered by topic.

Table 2: Mean scores by topic

N=50		Low difficulty /21	High difficulty /21
Fort	Mean	11.32	10.15
Judge	SD	4.65	4.79
Samson	Mean	10.38	12.70
Creek	SD	4.57	5.32

These demanded further consideration. The overall mean score on the Fort Judge material was 10.64, and that on the Samson Creek material was 11.54; thus there were no important differences in difficulty between the two topics. The topic means, however, gave cause for concern, for, while none of the differences was significant, the trends were in opposite directions: moving from low to high difficulty, mean scores fell on the Fort Judge material but rose on the Samson Creek material. Unless explanation could be found, this suggested that the manipulated variable was irrelevant, and that other factors were governing reader success. Such explanation can be found: the experimental population had been divided into two groups, and the level of success of these two groups could account for the apparent anomaly:

Table 3: Mean scores by experimental group

N=50	Low difficulty	High difficulty	Overall
Group 1	Fort Judge 11.12	Samson Creek 12.70	11.91
Group 2	Samson Creek 10.38	Fort Judge 10.15	10.26

Group 2 were thus, on average, less successful readers of this material, by a factor of about 1.6. Returning to Table 2, and applying such a factor, the mean score on the high difficulty Fort Judge material was depressed, while that on the Samson Creek high difficulty material was equivalently raised, in such a way that the material remained an

apparently potentially valid means of investigating the manipulated variable.

Table 4, below, shows the mean scores by sex.

Table 4: Mean scores by sex

N(boys)=27		Low difficulty	High difficulty
N(girls)=23		/21	/21
Boys	Mean	9.37	10.74
	SD	5.13	5.52
Girls	Mean	12.35	12.13
	SD	3.24	4.71

While the girls showed no real difference, one way related/ fixed analysis of variance showed that the boys found the high difficulty material significantly easier ($p=0.0333$).

Table 5: Analysis of Variance for boys' scores

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratio	Probability
Hi/lo difficulty	25.352	1	25.352	4.9505	0.0333
Subjects	1344.3	26	51.705	10.097	0.0000
Error	133.15	26	5.1211		
Total	1502.8	53			

The results were then considered by ability. Ability was judged by ranking the total scores for each pupil across the high and low difficulty materials. The top and bottom ten were then taken (5 from each topic, to counter any topic effect in the scores).

Table 6: Mean scores by ability

N=20		Low difficulty /21	High difficulty /21
Low ability	Mean	4.9	5.5
	SD	1.79	2.42
High ability	Mean	16.8	18.3
	SD	2.15	1.77

While there were no important differences in the scores of the less successful readers, one way related/ fixed analysis of variance showed that the more successful readers did significantly better on the high difficulty material than on the low difficulty material ($p=0.0146$).

Table 7: Analysis of Variance for the scores of able readers

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratio	Probability
Hi/lo difficulty	11.250	1	11.250	9.0000	0.0146
Subjects	58.450	9	6.4944	5.1956	0.0116
Error	11.250	9	1.2500		
Total	80.950				

4.10.7 Discussion

Hypothesis 1 was not supported. The results offer no evidence in support of the supposition upon which the hypotheses were based, that a preliminary gist summary would aid processing. The evidence gathered from this material tends to point in the opposite direction. The overall mean scores showed a trend towards higher scores on the high difficulty material, where no gist summary was provided, but this fell well short of significance. The difference was significant, though, for the

successful readers, and the boys: both did significantly better when no gist summary was provided. The sex effect cannot be explained away as a function of the ability effect, since overall mean scores by sex suggest that the girls were the slightly better readers. Thus Hypothesis 2 was supported only in as far as there was an ability effect; it was not the predicted effect. Hypothesis 3 was supported.

It is difficult to account for these results. One explanation might be that the presence of an initial gist summary deterred readers in two ways: it lengthened the passage, and it meant that the opening paragraph was rather dense, complex and abstract. Furthermore, nothing preceded it; the reader was offered nothing to which it could be linked, or by which it could be organised (Ausubel 1968). The ability result argues against this: surely those factors would deter the less successful reader more than the successful reader? In this study, the less successful readers were the less affected. It may be, however, that the least successful readers were operating at a level where their responses were guided as much by chance as by their processing activities; that because they floundering helplessly anyway, they were apparently less affected by the manipulated variable, whatever the direction of the effect.

4.10.8 Conclusions

The results show that, for these experimental materials, the presence of a preliminary gist summary appears to impede processing, most markedly for boys and for the more successful readers.

CHAPTER 5 STAGE TWO OF THE EXPERIMENTAL STUDIES.

5.1 The Stage One results, and their implications for Stage Two.

A very compressed, study-by-study summary of the first stage is shown below. In each of the ten studies, a potential source of difficulty in reading comprehension was probed (see 3.2); in each study, texts were generated in which the difficulty was prominent, and matched texts were prepared in which it was not. Pupils read texts of both types, and their comprehension was assessed immediately after reading, with the text removed. Experimental populations varied in size from about 40 to 100, and comprised pupils mainly in the 11 to 12 age range, with a wide range of reading ability. Results were analysed to consider:

- (i) overall reading scores
- (ii) reading scores by sex
- (iii) reading scores by ability

The summary comprises those results that were statistically significant at the 5% level or above, but mentions too those trends or patterns that seemed marked and consistent enough to suggest further investigation.

Study 1: Motivational effect of genre

- (i) No overall effect
- (ii) Girls more effective in narrative, boys in exposition
- (iii) No ability effect

Study 2: Redundancy/ text density

- (i) No overall effect
- (ii) No sex effect
- (iii) Text density did not affect performance of less successful, but more successful did significantly better on high density text

Study 3: Cohesive explicitness and the role of the 'signal' word

- (i) No overall effect
- (ii) No sex effect
- (iii) Successful readers relatively unaffected by the presence or absence of signal words, but less successful did better with the shorter sentences, even though that brevity had been achieved at the cost of apparently important cohesive links.

Study 4: Level of inferencing

- (i) No overall effect, though consistent trend suggested that implicit inferencing was a burden to all readers
- (ii) No sex effect
- (iii) No ability effect

Study 5: Lack of structure

- (i) Overall, some evidence that jumbled structure harder
- (ii) By sex, girls apparently unaffected by structure, while some evidence that boys were affected, finding jumbled harder
- (iii) No significant ability effect, though a suggestion that less successful readers might perform better with jumbled structure

Study 6: Instantiation

- (i) No overall effect on general comprehension, but given specific cues at storage, readers did tend to store text content at specific level of instantiation
- (ii) Girls more likely to instantiate at specific level when presented with cues at specific level, while boys unaffected; no effect on general comprehension
- (iii) Some ability effect, in that there was a significant interaction between the responses of successful and less successful readers: successful readers more likely to instantiate specifically given specific cues, while

unsuccessful readers more likely to instantiate specifically given general cues.

For general comprehension, similar cross-over effect, though short of significance: successful readers appeared to prefer specific cues, while less successful showed higher mean score for general cues

Study 7: Deductive/ inductive paragraph organisation

- (i) Some evidence that deductive structure preferred overall
- (ii) Girls significantly better on deductive paragraph organisation
- (iii) Less successful readers unaffected by paragraph organisation, but successful readers much helped by deductive organisation

Study 8: Causal chain characteristics

- (i) Overall, dead end propositions less well retained, but presence of dead end events made no difference to general comprehension/ retention, for any category of readers
- (ii) No sex effect for general comprehension/ retention
- (iii) No ability effect for general comprehension/ retention. Successful readers tended not to retain dead end propositions, but unsuccessful readers did tend to retain them

Study 9: Topic concreteness

- (i) No overall effect
- (ii) No sex effect
- (iii) No ability effect

Study 10: Gist summary at the start of the passage

- (i) No overall effects, though trend towards higher scores with no gist summary
- (ii) Boys performed better with no gist summary, while girls unaffected
- (iii) Less successful unaffected, while successful performed better with no gist summary

To gain a clearer picture of what this meant for different categories of readers, information was extracted for the table below to consider:

- (i) results for the experimental population as a whole;
- (ii) results by sex;
- (iii) results by ability.

READERS	HOW AFFECTED	UNAFFECTED BY
Population as a whole	<ul style="list-style-type: none"> - Impeded by unfamiliar structures - Impeded by inductive paragraph organisation - Impeded by high demand propositional inferencing (trend only) - Impeded by an initial gist summary (trend only) - Helped in instantiating at specific level by specific cues - Unlikely to retain dead end events 	<ul style="list-style-type: none"> - Genre (narrative/ exposition) - Absence of 'signal' words - Instantiation demands, with respect to overall comprehension - causal chain characteristic with respect to overall comprehension - text density/redundancy - topic concreteness
Boys	<ul style="list-style-type: none"> - Impeded by unfamiliar text structure - Impeded by an initial gist summary - preferred expository genre 	<ul style="list-style-type: none"> - Absence of 'signal' words - Instantiation demands, both with respect to overall comprehension and to the level of specificity at which information is stored. - Paragraph organisation - Causal chain characteristics, with respect to overall comprehension - Text density/ redundancy - Topic concreteness
Girls	<ul style="list-style-type: none"> - Impeded by inductive paragraph organisation - Helped in instantiating at at specific level by specific cues - Preferred narrative genre 	<ul style="list-style-type: none"> - Text density/ redundancy - Absence of 'signal' words - Familiarity of text structure - Instantiation demands, with respect to overall comprehension - Causal chain characteristics, with respect to overall comprehension - Topic concreteness - Presence of an initial gist summary

READERS

HOW AFFECTED

UNAFFECTED BY

Successful readers	<ul style="list-style-type: none"> - Impeded by inductive paragraph organisation - Impeded by an initial gist summary - Helped by high density text - Helped in instantiating at specific level by specific cues - Were unlikely to retain dead end events - Helped in general comprehension by specific instantiation cues (trend only) 	<ul style="list-style-type: none"> - Genre (narrative/expository) - Absence of signal words - Familiar text structure - Causal chain characteristic with respect to overall comprehension - Topic concreteness
Unsuccessful readers	<ul style="list-style-type: none"> - Helped by absence of 'signal' words - More likely to instantiate at a specific level given cues at a general level - Helped in general comprehension by instantiation cues at a general rather than specific level (trend only) - Were likely to retain dead end events - Helped by unfamiliar text structure (trend only) 	<ul style="list-style-type: none"> - Genre (narrative/expo.) - Text density/ redundancy - Paragraph organisation - Topic concreteness - Causal chain characteristic with respect to general comprehension - Presence of an initial gist summary

The design purpose of the Stage Two study was to draw together, using a larger experimental population, those strands of exploration from Stage 1 that seemed most likely to cast further light upon our understanding of comprehension processes and reader difficulties. To that extent it was a replication study, but exact replication was not wanted: much had been learned from Stage 1 about text and test construction, and the Stage 2 design was to draw upon that experience to try to minimise confounding factors and to try to improve upon the power and the precision of the tools used.

What strands, then, did seem most promising? Clearly, the more focused the study is, the more effective it may be. Did the Stage One

results indicate with any clarity which areas might be excluded from Stage Two?

The results for the population as a whole, and the results by sex, were certainly of interest. But in terms of understanding reading failure, and in terms of conclusions that might offer teachers guidance about how to respond to poor performance with expository text in the classroom, those text features that distinguished between successful and unsuccessful readers seemed most promising. This suggested focusing upon:

- text density
- paragraph organisation
- effect of initial gist summary
- instantiation demands
- causal chain characteristics
- signal words
- familiarity of structure.

On such a basis, genre, inferencing demands and topic concreteness were excluded from further study (though this did not imply that they had nothing to offer to the final discussion, when the results of all the studies are considered with regard to the processes of reading).

This still left seven sources of difficulty to be probed further - all were valid and important focii for research, but there were too many, it was felt, to allow depth and precision in an experimental context such as this. Accordingly, a further narrowing was sought, this time on the basis of which areas seemed least likely to shed further light on the strategies and processes which distinguish the successful and unsuccessful reader. Familiarity of structure had offered only weak

evidence, and seemed relatively unlikely to yield any clear new insights; accordingly, it was excluded. Also excluded were instantiation demands; there was no decisive evidence that they played an important role in general comprehension, and the evidence about the levels of specificity at which information is stored was of interest, but perhaps not central to an understanding of the possible differences in processing strategies between successful and unsuccessful readers.

This left five areas to be investigated in the Stage Two study:

- text density
- paragraph organisation
- effect of initial gist summary
- causal chain characteristics
- signal words/ cohesive inferencing

These were further investigated with three possible ends in view:

- firstly, to consider their possible implications for the further development of the schema based model of reading put forward in Chapter Two;
- secondly, to use any differences between the results of successful and unsuccessful readers to consider possible development of that schema-based reading model in such a way that it better accounts for the difficulties with expository text experienced by some readers;
- and thirdly, to use any insights thus gained to suggest possible ways in which teachers might be able to respond to pupils' poor reading performance when using expository text in the classroom.

The Stage 1 studies explored along three dimensions: overall scores, scores by sex, and scores by ability. The last of these was chosen as the main vehicle for the second stage: comparison of the

comprehension performance of successful and unsuccessful readers was the concern that governed and directed choice of focus for Stage 2. That decision having been made, however, there still remained opportunity to continue with the investigation of some of the overall differences and sex differences. The most obvious sex difference from Stage 1, that of scores on narrative and exposition, could not be pursued, but had been confirmed elsewhere (Neville 1988). The chosen focus did, however, include the effects of paragraph organisation and initial gist summary, where some sex effects had been noted in Stage 1. Accordingly, analysis of Stage 2 data was not limited to the comparison of the performances of high and low ability readers: overall scores and scores by sex were analysed where appropriate.

The Stage One results had provided certain insights. These allowed speculation about how the underpinning model of reading outlined in Chapter 2 might be developed:

- a high density of new information aided able readers, while having no effect upon less successful readers - perhaps the successful readers found that the high level of new supporting detail confirmed their schema selection and operation, fleshing out schemas in current focus, making them more robust and effective; the reader who was not coping was unable to derive such advantage. Voss and Bisanz (1985), reporting more recent work with narrative, suggested something very close to this. They suggested that increasing the number of subordinate actions that elaborate the important actions of a story has the effect of increasing the recall probability of the latter - perhaps because this keeps the reader at the central events longer, clarifying, amplifying and embellishing the memory trace. They stress that this holds good only as long as the comprehender understands the relations that

make the added information elaborative. Stage 1 results bear this out, suggesting that the effect holds good for expository prose, as well as narrative.

- Successful readers were aided by paragraph organisation that opened with a statement of the main point, while less successful readers seemed unable to take advantage of this - such paragraph organisation would presumably help in the process of schema selection and confirmation, reducing the heavy cognitive demands of secondary processing;
- Successful readers appeared unaffected by the presence or absence of signal words, while less successful readers performed better in their absence; in schema terms, perhaps it is the lower level schemas that are implicated here. That is, poor readers have the higher level discourse skills needed to make use of signal words, and would indeed have done so, even though successful readers have no apparent need of them, but they do not do so because the material with signal words was characterised by longer sentences. These poorer readers lack the necessary awareness of syntactic and semantic markers that is needed to deal with long sentences. They lack the reading experience needed to process in large enough chunks of text to enable them to cope confidently with the longer sentences.
- Successful readers were less likely to retain dead end events than were the less successful readers - in schema terms, it seems likely that this is a function of difficulty and demotivation, and that given text with which they can cope, the less able readers also would focus upon schema content rather than the 'weird list' of deviant items which make up the dead end events.

- Successful readers were impeded by an initial gist summary, but less successful readers were unaffected - while passage length may have been a confounding variable here, it seems more likely that those readers who were able to cope with the passage were daunted by the conceptual density of the opening paragraph; or perhaps such an initial attempt by the author to impose a complete, 'ready-use' schema, one of his own pattern, preference and construction, constitutes a case of 'overkill': the reader needs the freedom to draw upon his or her own unique reading experiences, to build a text representation that is uniquely his or her own, albeit parallel to that of the author. Such an interpretation would tie in with the reader's positive utilisation of deductive paragraph organisation: cues at a paragraph level, rather than at a whole text level, are cues at a more appropriate level. Again, presumably the less successful readers were unaffected because they had given up to some extent. Possibly the maze of other difficulties confronting them masked any effect from the manipulated variable.

These speculations, then, arising from the Stage One results, outline the understandings with which Stage Two was approached, and indicate the questions to which answers were being sought. A recurring theme is that of the less successful readers apparently failing to take advantage of a text feature successfully utilised by more able readers: were they intrinsically unable to make use of the support offered by such text features as deductive paragraph organisation, or did they possess the potential to do so, but fail to do so simply because they had given up with that passage, and ceased to operate to the best of their ability? Was failure to utilise a certain text feature a function of an inability to utilise that text feature, or was it a function of a

reader's rejection of text that was too difficult, that daunted and demotivated, so that they would be unlikely to deploy a strategy even if they had access to it? The central hypothesis that follows, in Stage 2, is based on the latter assumption: that the less successful readers have access to an adequate repertoire of higher level discourse processing skills, but that their limitations with lower level reading skills often prevent them from deploying their higher level skills. Lessen the difficulties at the lower levels of processing, it is suggested, and the higher level skills will be deployed.

The schema-based view of how we organise our knowledge and experience lends weight to this idea, that the skills are there but sometimes masked: we all seek structure and meaning in our every encounter with the world about us, and we learn precisely because we possess a well developed capacity to make sense of situations (Donaldson 1978, Smith 1978). Children are exposed to, and make sense of, a great deal of discourse prior to reading, and it does not seem likely that the discourse features being probed in this study are exclusive to written text. The supposition here, then, is that most children, including those who later find reading difficult, do possess higher order discourse processing skills, but sometimes may be unable to deploy them.

Neville's comprehensive survey of reading, writing, talking and listening (1988) provides some evidence in this direction. Using informative and narrative text, she compared the comprehension scores of pupils in the two modes of reading and listening, at three stages, Primary 4, Primary 7 and S2. While the mean scores of the pupils at all the stages showed that they performed better when reading narrative text than when listening to it, there was a marked cross-over effect between reading and listening when informative text was used. At Primary 4,

pupils were more effective when they listened to informative text than when they read it; by Primary 7, they were more effective when they read it. It thus seems that, among readers functioning at this level (and many of the less successful readers in these studies would be pupils with measured reading ages roughly equivalent to those of an eight or nine year old), informative text is better heard than read. Why should this be ? It may be argued that their general discourse processing skills, deployed without restraint while listening, were constrained and limited in reading by their underdeveloped ability to process written discourse, except in the very familiar and predictable field of narrative.

To explore this supposition, it was decided that Stage Two experimental material should comprise two, parallel strands: in one, the targeted sources of difficulty should be presented at a level of difficulty similar to that of the Stage One studies - this would provide the replication element in the study; in the other, the same variables would be considered, but at a much lower level of text difficulty, thereby lessening (though not removing) the limitations imposed by such lower level processing deficits as difficulty with more complex phonic synthesis, longer words, longer sentences, and more complex syntax and sentence structure.

5.2 The second stage study.

Focus: To consider the effects upon readers' comprehension of varying:

- text density
- paragraph organisation
- causal chain characteristics
- signal words
- the position of a gist summary,

by comparing, at two levels of text difficulty:

- (i) comprehension of the population overall when the targeted textual feature is prominent, and when it is not prominent;
- (ii) the responses of boys and girls to these variations;
- (iii) the responses of successful and unsuccessful readers to these variations.

Theoretical context: The assumptions upon which the hypotheses are based were discussed in 5.1 above. The primary design intention of this study was to focus upon apparent differences between successful and less successful readers, to test the hypothesis that less successful readers do possess higher order processing skills, but may not access them when daunted by their limitations with such lower order skills as letter recognition, word recognition, and use of syntactic and semantic markers to 'chunk' successfully, and deal with long sentences. Putting this another way, the hypothesised difference between the higher order reading skills of successful and unsuccessful readers is one of access to, rather than possession of, these skills. Both groups, it is hypothesised, possess the skills, and the test scores of the less successful should indicate that they can respond to these higher order text

features in the same ways that skilled readers respond to them (Hypothesis 3(i)); but, faced with text that is difficult, the less successful readers may not always access these skills, although they possess them.

While this 'access/possession' issue provided the main design framework, and informed the central hypothesis (Hypothesis 3); the secondary intention was to use the larger experimental population for partial replication and further development of some of the Stage 1 studies (Hypothesis 1), and exploration of a possible sex effect (Hypothesis 2).

5.2.1 Hypotheses

1. (i) That test scores will be higher where there is a high density of elaborative detail in an expository text;
(ii) That test scores will be higher where there is deductive paragraph organisation;
(iii) That dead end events are less likely to be retained than are similar events that lie on the causal chain;
(iv) That test scores will not be lower if signal words are left for the reader to infer, rather than explicitly provided;
(v) That an initial gist summary will lead to lower test scores.
2. That there will be a sex difference apparent in the responses of boys and girls to these text variations.

3. (i) That the test scores of the less successful readers will demonstrate some facility for making use of these higher order text features under some textual circumstances.
- (ii) But that this will occur less the more difficult the text material.

5.2.2 Methods

Text materials were constructed in which the targeted differences were presented in as obvious a manner as was possible without damaging the ecological validity or the credibility of the passages. This attempt to increase the extent to which the manipulated variable differed between the matched text pairs, to make the differences rather more pronounced than they had been in the Stage 1 studies, represented one important methodological difference between the Stage 1 studies and Stage 2. Another difference lay in text length: there were five text features, each to be explored in four ways:

- normal difficulty text, feature prominent;
- normal difficulty text, feature not prominent;
- simpler text, feature prominent;
- simpler text, feature not prominent.

This meant text materials comprising twenty elements. Here lay the second important difference between the stages: because all five text features were to be explored in the single experiment, the material had to be focused and concentrated, and the pieces of reading used to probe each text feature were shorter.

Each feature was to be investigated separately. Without such separation, assessment data would probably be confounded by problems of

mutual interference, so that results would not allow the analyst to isolate the effects of a specific text feature. At the same time, use of twenty separate topics would have brought problems of matching reader knowledge and topic familiarity across the elements; accordingly, a single text was constructed, made up of twenty related but separate sections (see 5.2.3 below, Table 1. The full text and test are shown at Appendix 13).

The primary aim was to compare performance of readers within each numbered cell in Table 1 (overleaf); that is, between Condition A and Condition B in each cell; for example, between high and low density material in normal difficulty text; or between deductive and inductive paragraph organisation in simpler text. It would have been tempting to seek to make further comparisons between the numbered cells (that is, between the text features under investigation); for example, whether varying text density has a greater effect on a reader than does varying the causal chain characteristics. But such a design would have entailed careful matching of all twenty text elements, posing great difficulties in adequately matching the passages. Testing the hypotheses required matching only within the cells, and it was felt that this could be achieved with some degree of rigour.

Each pupil read all twenty elements. To avoid the effects of fatigue and practice, the order of the elements was varied from pupil to pupil, although paired elements within each cell remained adjacent. However, to avoid less successful readers being demotivated by difficult text before being exposed to all of the simpler pieces, all pupils read the ten simpler elements first. Assessment was in two sections: at the end of the simpler elements, and at the end of the normal difficulty

elements, as appropriate. Readers did not have access to the relevant elements during assessment.

5.2.3 Materials

The features being investigated are shown below.

	Normal difficulty text elements		Simpler text elements	
	Condition A	Condition B	Condition A	Condition B
text density	high density	low density (1)	high density	low density (2)
para. org.	deductive	inductive (3)	deductive	inductive (4)
causal chain	no dead ends	dead ends (5)	no dead ends	dead ends (6)
signal words	explicit	implicit (7)	explicit	implicit (8)
gist summary	provided at start	not provided (9)	provided at start	not provided (10)

The simpler elements were characterised by shorter overall length, shorter sentences, and words that were generally shorter and likely to be more familiar. Hofland's and Johansson's word frequency count (1982), based on analysis of 500 British English texts and 500 American English texts, was used as a guide to probable lexical familiarity. In general, only high frequency words were used; in certain cases, words shown to be potentially less familiar were used, such as 'shelter' and 'forge', on the grounds that their contexts were supportive enough to remove any difficulty:

'The valley forests give shelter from the cold winds'

and

'Iron things are made in a forge.'

But even relatively comprehensive frequency studies must be limited, and can serve as no more than a guide: one word, 'bamboo', was retained despite not being shown at all in the frequency tables, on the grounds that it appeared in a supportive context, was deemed likely to be familiar, and was phonically simple.

The experience gained in Stage 1, combined with the relative brevity of the text elements in Stage 2, allowed a close match between text elements within each cell:

Variable	Degree of matching
passage length	identical (see note below)
sentence length	identical (see note below)
sentence numbers	identical
text structure	identical
text/ para organisation	identical (except where the target variable)
given/ new	identical (except where the target variable)
'signal' words	identical (except where the target variable)

Note: The material in Cells 7 and 8, the signal word elements, was matched within each cell for sentence length, except that the presence/absence of the signal words themselves precluded an identical match. (This had not been the case in Stage 1, Study 3, where the signal words had been used in such a way as to increase markedly sentence length; but it was felt that sentence length might have been a confounding variable in Study 3, and as such was avoided in this study.)

For the demands of inferencing, instantiation, causal chain characteristics, topic concreteness, importance ranking, lexical familiarity, topic familiarity, and curriculum area, use of the same

template in generating each of paired elements ensured apparently adequate matching. (See Appendix 13 for these templates)

Assessment was by means of open ended questions (questions 1 to 16 in each test - see Appendix 13), except for those parts dealing with recognition of propositions either on or off the causal chain (question 17 in each test). As with the text material, Part 1 of the test was concerned with the simple level text, and Part 2 the normal level.

While open ended questions had been little used in Stage 1, it was felt that the demands of the Stage 2 study were different: one technique was needed that would be valid for most of the text features being probed, and open ended questions seemed the most promising. The experimental design sought to probe how comprehension might be affected by the presence or absence of five text features, in both simple text and normal text. If comprehension were to be measured by use of objective techniques, a relatively large number of questions would be needed for each feature at each level. This would make for an excessively lengthy test. But by using open ended questions (for all the features except the causal chain), it was felt the scorer would be able to gauge adequately how well the reader had understood and retained the targeted material using far fewer questions (- this did prove to be the case). Accordingly, comprehension of each feature (except the causal chain items) was probed by two questions in each condition and at each level (questions 1 to 16 in each test), and scores of 0, 1 or 2 were awarded for each feature. This small number of questions for each feature meant that the scores had to be treated as categorical data, and be analysed using less powerful non-parametric statistical tests; but the choice of open-ended questions as the assessment technique did allow

for adequate assessment of each feature using only two questions in each condition and level, thereby keeping the tests at a reasonable length.

The greatest potential weakness of open ended questions, that different readers might respond at different levels to an open ended question, did not apply here. In this study, comparisons between readers were needed only in as far as groups of successful and less successful readers had to be identified, and it was felt that open ended questions could be used for this. Beyond that, comparisons between readers were not of interest: the concern was to compare the scores of the same reader in the presence or absence of certain text features. In addition, it was felt that the way in which a pupil answers an open ended question, be the response right or wrong, may reveal much about how he or she has understood the material. Such an analysis of responses was seen as an option which should be retained. Pupil responses were marked by the experimenter, but comprehensive model answers had been prepared prior to marking, and all doubtful answers were referred to an independent marker.

To assess pupil responses to variations in causal chain characteristics, the same technique was used as in Stage 1 (Study 8): pupils were asked to identify which sentences they remembered from the passage, from a list that included the target propositions, both those on and those off the causal chain, and some distractors. (Question 17 in each test).

The materials were piloted on an opportunity sample of S3 pupils ($N=24$). Though these pupils were older than the intended experimental population, they ranged in measured reading age from about 8 to 17+, a range similar to that of a first year class. In addition, they provided

valuable comments and suggestions, being perhaps more detached and reflective than a first year pilot group might be. All the pupils finished well within the hour available. Most agreed that it was better to do both parts of the test at one sitting. Most professed to find it quite easy. One of the less skilled readers spoke, with some feeling, of how boring he found it; another gave the impression that he found the list-like structure burdensome: "All these things about these people, sir - it goes in one ear and out the other." The trials revealed no evident weaknesses in the material, but caused the marking scheme to be revised and extended in several places.

5.2.4 Subjects

The main experimental population comprised the entire S1 intake (11/12 year olds) of a large, city comprehensive, representing a wide range of ability ($N = 160$).

5.2.5 Administration

The materials were administered in two parts, in the form of two booklets, the simpler materials in the first booklet followed by a booklet of the normal difficulty materials, with assessment on completion of each part. Pupils did not have access to the text during assessment. Within each part, as explained, the booklets were assembled so that the order of the elements was varied, to allow for the effects of practice and fatigue. Pupils wrote their answers on a separate answer form.

5.2.6 Results

The results for each of the three strands (overall scores, scores by sex, and scores by ability) are presented below. The five text features under scrutiny are examined within each of these strands. Analysis of variance was used for the causal chain data, there being an adequate range of scores. For the other features, readers could score only 0, 1 or 2. The data was thus treated as categorical data, and Chi Squared was used. Mean scores are included with the Chi results, to indicate the direction of difficulty. The contingency tables for the Chi results and the ANOVA tables are shown at Appendix 14.

(i) Overall Scores

Table 1. Density of supporting information

Simple level text: High density mean score	1.34
Low density mean score	1.58
Chi Squared = 8.014, p < 0.01	
Normal level text: High density mean score	0.875
Low density mean score	1.18
Chi Squared = 9.369, p < 0.01	

Table 2. Deductive/Inductive paragraph organisation

Simple level text: Deductive mean score	1.07
Inductive mean score	0.97
Chi Squared = 2.853, p > 0.05	
Normal level text: Deductive mean score	1.39
Inductive mean score	0.77
Chi Squared = 64.3, p < 0.01	

Table 3. Causal chain characteristics

N=160		Simple text (/5)	Normal text (/5)
On chain	Mean	3.66	3.96
	SD	1.38	1.31
Off chain	Mean	3.76	3.59
	SD	1.43	1.34
Stat. sig.		p=0.3143	p=0.0007

Table 4. Explicit/implicit use of signal words

Simple level text: Explicit mean score 1.26
Implicit mean score 0.95
Chi Squared = 13.414, $p < 0.01$

Normal level text: Explicit mean score 0.99
Implicit mean score 0.88
Chi Squared = 8.982, $p < 0.02$

Table 5. Effect of initial gist summary

Simple level text: Gist mean score 1.36
No gist mean score 1.3
Chi Squared = 0.250, $p > 0.05$

Normal level text: Gist mean score 0.7
No gist mean score 0.11
Chi Squared = 107.629, $p < 0.01$

(ii) Scores by sex

Table 6. Total scores, by sex

N(girls)=82 N(boys)=78 (Max. score 52)

Girls	Mean	30.80
	SD	9.22
Boys	Mean	32.53
	SD	8.51
Statistical sig. $p=0.22$		

Table 7. Density of supporting information

Boys, simple level text: High density mean score 1.38

Low density mean score 1.60

Chi Squared = 3.258, $p > 0.05$

Girls, simple level text: High density mean score 1.29

Low density mean score 1.55

Chi Squared = 4.81, $p < 0.05$

Boys, normal level text: High density mean score 0.78

Low density mean score 1.03

Chi Squared = 2.767, $p > 0.05$

Girls, normal level text: High density mean score 0.96

Low density mean score 1.33

Chi Squared = 7.934, $p < 0.02$

Table 8. Deductive/inductive paragraph organisation

Boys, simple level text: Deductive mean score 1.09

Inductive mean score 1.12

Chi Squared = 1.367, $p > 0.05$

Girls, simple level text: Deductive mean score 1.05
 Inductive mean score 0.83
 Chi Squared = 3.172, $p > 0.05$

Boys, normal level text: Deductive mean score 1.37
 Inductive mean score 0.79
 Chi Squared = 34.343, $p < 0.01$

Girls, normal level text: Deductive mean score 1.40
 Inductive mean score 0.74
 Chi Squared = 32.117, $p < 0.01$

Table 9. Causal chain characteristics

N(girls)=82 N(boys)=78

		Simple text (/5)		Normal text (/5)	
		Boys	Girls	Boys	Girls
On chain	Mean	3.96	3.37	3.97	3.95
	SD	1.20	1.48	1.31	1.32
Off Chain	Mean	4.00	3.52	3.51	3.67
	SD	1.25	1.55	1.32	1.36
Statistical sig.		0.7431	0.3188	0.0070	0.0294

Table 10. Explicit/implicit use of signal words

Boys, simple level text: Explicit mean score 1.32
 Implicit mean score 1.08
 Chi Squared = 4.676, $p > 0.05$

Girls, simple level text: Explicit mean score 1.20
 Implicit mean score 0.84
 Chi Squared = 9.144, $p < 0.02$

Boys, normal level text: Explicit mean score 1.01
 Implicit mean score 0.97
 Chi Squared = 2.286, $p > 0.05$

Girls, normal level text: Explicit mean score 0.98
 Implicit mean score 0.79
 Chi Squared = 7.419, $p < 0.05$

Table 11. Effect of initial gist summary

Boys, simple level text: Gist mean score 1.42
 no gist mean score 1.28
 Chi Squared = 1.409, $p > 0.05$

Girls, simple level text: Gist mean score 1.28
 no gist mean score 1.32
 Chi Squared = 0.105, $p > 0.05$

Boys, normal level text: Gist mean score 0.64
 no gist mean score 0.13
 Chi Squared = 41.688, $p < 0.01$

Girls, normal level text: Gist mean score 0.76
 no gist mean score 0.10
 Chi Squared = 58.421, $p < 0.01$

(iii) Scores by ability

Readers' total scores were ranked, and analyses were carried out for each text feature, for the forty most successful readers and the forty least successful.

Table 12. Density of supporting information

High ability readers, simple level text:

High density mean score 1.825
 Low density mean score 1.9
 Chi Squared = 0.181, $p > 0.05$

(with Yates's correction for low frequencies)

Low ability readers, simple level text:

High density mean score 0.65

Low density mean score 1.125

Chi Squared = 6.241, $p < 0.01$

High ability readers, normal level text:

High density mean score 1.7

Low density mean score 1.925

Chi Squared = 4.804, $p < 0.05$

(with Yates's correction for low frequencies)

Low ability readers, normal level text:

High density mean score 0.25

Low density mean score 0.5

Chi Squared = 1.726, $p > 0.05$

Table 13. Deductive/inductive paragraph organisation

High ability readers, simple level text:

Deductive mean score 1.65

Inductive mean score 1.7

Chi Squared = 2.505, $p > 0.05$

(with Yates's correction for low frequencies)

Low ability readers, simple level text:

Deductive mean score 0.65

Inductive mean score 0.45

Chi Squared = 0.474, $p > 0.05$

High ability readers, normal level text:

Deductive mean score 1.925

Inductive mean score 1.3

Chi Squared = 16.05, $p < 0.01$

Low ability readers, normal level text:

Deductive mean score 0.925

Inductive mean score 0.4

Chi Squared = 14.532, $p < 0.01$

Table 14. Causal chain characteristics

(N=80)

		Simple text (/5)		Normal text (/5)	
		hi ab	lo ab	hi ab	lo ab
On chain	Mean	4.525	2.625	4.525	2.75
	SD	0.64	1.55	0.82	1.61
Off Chain	Mean	4.5	2.675	4.375	2.575
	SD	0.82	1.73	0.81	1.48
Statistical sig.		0.8759	0.8144	0.2427	0.5505

Table 15. Explicit/implicit use of signal words

High ability readers, simple level text:

Explicit mean score 1.65

Implicit mean score 1.5

Chi Squared = 1.352, $p > 0.05$

Low ability readers, simple level text:

Explicit mean score 0.975

Implicit mean score 0.475

Chi Squared = 7.273, $p < 0.01$

High ability readers, normal level text:

Explicit mean score 1.225

Implicit mean score 1.45

Chi Squared = 1.875, $p > 0.05$

Low ability readers, normal level text:

Explicit mean score 0.825

Implicit mean score 0.475

Chi Squared = 10.025, $p < 0.01$

Table 16. Effect of initial gist summary

High ability readers, simple level text:

Gist mean score 1.875

No gist mean score 1.65

Chi Squared = 0.779, $p > 0.05$

(with Yates's correction for low frequencies)

Low ability readers, simple level text:

Gist mean score 0.75

No gist mean score 0.975

Chi Squared = 3.387, $p > 0.05$

High ability readers, normal level text:

Gist mean score 1.1

No gist mean score 0.3

Chi Squared = 33.884, $p < 0.01$

Low ability readers, normal level text:

Gist mean score 0.25

No gist mean score 0

Chi Squared = 9.257, $p < 0.01$

(with Yates's correction for low frequencies)

5.2.7 Discussion

This discussion will be brief, and will consider Stage 2 as a free standing entity, in isolation from the preceding studies. In Chapter 6, Stages 1 and 2 will be considered together, and in relation to one

another. It is there that the implications of the combined results will be explored and discussed in more detail.

Hypotheses 1(i) to 1(v) dealt with the patterns that were expected to emerge from the overall scores:

- Hypothesis 1(i) predicted that high text density would improve recall. At both simple and normal levels of text difficulty, the results (Table 1) demonstrated the reverse effect ($p < 0.01$): readers did generally better where there was a low density of supporting information.
- Hypothesis 1(ii) predicted that deductive paragraph organisation would support and improve recall. The evidence (Table 2) supported the hypothesis with both simple text ($p < 0.05$) and normal difficulty text ($p < 0.01$). Seemingly the intended gradient of difficulty had not been achieved when the material was prepared, since readers found the 'normal' difficulty text easier than the 'simple' text. Nevertheless, the direction of difficulty was consistent at both levels, and there seems no reason to doubt the validity of the material.
- Hypothesis 1(iii) predicted that events on the causal chain were more likely to be retained than dead end events. For simple text there were no significant differences (Table 3); for text at a normal level of difficulty, the evidence supported the hypothesis ($p < 0.01$): causal chain events were better recalled than dead end events. However, again the intended gradient of difficulty apparently had not been achieved when the material was prepared, and pupils appeared to find the 'normal' level 'on-chain' material easier than all the other causal chain material. This in itself would not invalidate the experimental material. However, the direction of difficulty was different at simple and normal text

levels. This does appear to suggest that some factor, or factors, other than the causal chain characteristics were significant in determining the success of reader responses. In light of this, none of the causal chain results can be regarded as valid.

- Hypothesis 1(iv) predicted that readers did not need explicit signal words: it was hypothesised that readers would manage equally well when the signal words remained implicit. The evidence did not support this (Table 4); explicit signal words appeared to help the reader both at a simple text level ($p < 0.01$) and at a normal level of difficulty ($p < 0.02$).
- Hypothesis 1(v) predicted that an initial gist summary would impede recall. The results (Table 5) indicated that the reverse was true: a gist summary aided recall, both at simple level ($P < 0.05$) and at normal level ($p < 0.01$).

While the results were not always as expected, they did (causal chain excepted) demonstrate some clarity and consistency. The split nature of the design, with the same feature being tested twice, at a 'simple' and at a 'normal' level, allowed an element of replication. For each feature, except for the causal chain material, the two levels did replicate one another. This evidence supports the validity of the material in regard to the text feature studied.

Hypothesis 2 predicted some differences in the responses of boys and girls to these text features.

- Taking the total overall scores, there were no significant differences to be attributed to sex (Table 6).
- Taking text density alone, the pattern reflected that of the overall scores, with readers appearing to prefer a low density of supporting information (Table 7). However, these differences were not significant for boys either at simple or normal levels of text

difficulty, while for girls they were significant at both simple level ($p < 0.05$) and at normal level ($p < 0.02$). Although these are not high significance levels, it seems clear that, for this population, with this experimental material, girls were aided by low text density to a greater extent than were boys.

- In looking at paragraph organisation, no significant differences emerged for boys or girls at the simple text level (Table 8). At normal text level, boys and girls reflected, to similar extent ($p < 0.01$), the overall trend of an apparent preference for deductive organisation. There were, then, no sex differences apparent in response to paragraph organisation.
- The causal chain analyses are discredited, on account of the dubious validity of the experimental material (see above).
- There did appear to be a small though perceptible sex difference in response to the explicitness of signal words (Table 10). Both boys and girls reflected the overall pattern of better recall of explicit material, but it was not significant for boys at either text level, while for girls it was significant at simple level ($p < 0.02$) and at normal level ($p < 0.05$).
- The presence or absence of an initial gist summary appeared not to affect either boys or girls to a significant extent at simple text level (Table 11). At normal level, both boys and girls reacted in the same way and to a similar extent ($p < 0.01$), in showing markedly better recall when provided with an initial summary.

Hypothesis 2, then, was supported only for text density and the explicitness of signal words. Interestingly, the direction was the same in both cases, with girls emerging as apparently more sensitive than boys in response to variations in these features.

Hypothesis 3 was based upon the belief that poor readers are limited by deficits in their 'lower order' print processing skills, rather than the kind of 'higher level' general discourse processing skills that might be common to both heard and read discourse. It was expected that the less successful readers would demonstrate a potential ability to make use of the targeted text features in the same way that the skilled readers made use of them; at the same time, it was expected that this ability might sometimes be obscured with the more difficult pieces of text, where print processing difficulties might preclude the deployment of the available higher level skills.

- Text density results showed consistently higher mean scores on low density text for both skilled and unskilled readers, at both simple and normal text levels (Table 12). With the simpler text, the difference was significant only for the unskilled readers ($p < 0.01$). At normal level of text difficulty, the difference reached significance only for the skilled readers ($p < 0.05$). These results do lend some support to Hypothesis 3(i), in that both groups of readers (skilled and unskilled) appeared to react to text density in a similar way. There was some support, too, for Hypothesis 3(ii): the low mean scores of the unskilled readers demonstrated that they found the normal level text density material very difficult. When faced with this difficulty, it appeared that they could no longer access, to any significant extent, the processing strategies that had helped them with simpler text.
- The ability results for paragraph organisation showed no significant differences for skilled or unskilled readers with the simple level text. At 'normal' text level, both skilled and unskilled readers appeared to find the deductive material significantly easier ($p < 0.01$). However, the intended gradient of difficulty had not been achieved when the material was generated:

both skilled and unskilled readers found, for the deductive material, that the 'normal' difficulty material was easier than the 'simple' material:

High ability readers, simple level text:

	0	1/2	total
Deductive	6 (3.5)	34 (36.5)	40
Inductive	1 (3.5)	39 (36.5)	40
total	7	73	80

Deductive mean score 1.65

Inductive mean score 1.7

Chi Squared = 2.505, $p > 0.05$

(with Yates's correction for low frequencies)

High ability readers, normal level text:

	0/1	2	total
Deductive	3 (11)	37 (29)	40
Inductive	19 (11)	21 (29)	40
total	22	58	80

Deductive mean score 1.925

Inductive mean score 1.3

Chi Squared = 16.05, $p < 0.01$

Low ability readers, simple level text:

	0	1/2	total
Deductive	23 (24.5)	17 (15.5)	40
Inductive	26 (24.5)	14 (15.5)	40
total	49	31	80

Deductive mean score 0.65

Inductive mean score 0.45

Chi Squared = 0.474, $p > 0.05$

Low ability readers, normal level text:

	0/1	2	total
Deductive	10 (18.5)	30 (21.5)	40
Inductive	27 (18.5)	13 (21.5)	40
total	37	43	80

Deductive mean score 0.925

Inductive mean score 0.4

Chi Squared = 14.532, $p < 0.01$

When the test results were re-categorised accordingly, on the normal/simple factor, Hypothesis 3(i) was supported by the results: where the readers actually found the material to be easy (rather than where it had been intended they should find it easier), unskilled readers made the same use of deductive organisation as did the skilled readers. Similarly, where they

actually found the text to be harder (rather than where it had been intended they should find it harder), the results for the unskilled readers bear out Hypothesis 3(ii): when faced with difficulty, they appeared unable to take significant advantage of the deductive organisation.

- The causal chain analyses are discredited, on account of the dubious validity of the experimental material (see above).
- Varying the explicitness of signal words (Table 15) showed no significant effects among skilled readers at simple or normal text levels. Unskilled readers, however, appeared to prefer explicit signal words at simple text level ($p < 0.01$) and at normal text level ($p < 0.01$). This reflected the pattern among the overall experimental population (although not that of the top forty readers). Thus Hypothesis 3(i) is supported by the evidence: unskilled readers appear to be making use of the same text features as the rest of the population. These experimental materials offered no evidence to support Hypothesis 3(ii); but the mean scores of the unskilled readers show that they did not find the normal level material much harder than the simple level material. More challenging material would be needed if the hypothesis were to be properly tested.
- Ability results for the presence or absence of a gist summary indicated no significant differences for skilled or unskilled readers at simple text level (Table 16). At normal text level, however, both groups of readers found the gist summary helpful ($p < 0.01$).

High ability readers, normal level text:

	0	1/2	total
Gist	8 (21)	32 (19)	40
No gist	34 (21)	6 (19)	40
total	42	38	80

Gist mean score 1.1

No gist mean score 0.3

Chi Squared = 33.884, $p < 0.01$

Low ability readers, normal level text:

	0	1/2	total
Gist	30 (35)	10 (5)	40
No gist	40 (35)	0 (5)	40
total	70	10	80

Gist mean score 0.25

No gist mean score 0

Chi Squared = 9.257, $p < 0.01$

(with Yates's correction for low frequencies)

In the case of the low ability readers, the raw scores merit attention in their own right: without the help of a gist summary, none of the forty poorest readers were able to gain even a single mark. The text and test material appeared decisively beyond their grasp. Yet inclusion of a gist summary appeared to make a similarly decisive difference, and ten of the forty were able to score. They

appeared to be making use of a higher level text feature even when in considerable overall difficulty. This supports, quite dramatically, Hypothesis 3(i): unskilled readers appeared to make use of the same text feature as the skilled readers, even when struggling with apparently very demanding text. Hypothesis 3(ii) was, then, not supported: these very low mean scores of the unskilled readers on the normal level material shows that they were in difficulty, yet still they appeared to benefit from a gist summary.

5.2.8 Conclusions

With the notable exception of the causal chain material, the internal consistency of the results allow a certain confidence in their validity. The most obvious failing of the experimental material lay in the failure to achieve the desired gradient of difficulty from simple text to normal level text. In retrospect, too, it is clear that it might have been statistically more effective to narrow the assessment focus: seeking responses to twenty separate text elements without using an excessively lengthy test meant that there could not be a large number of questions for each element. Only two questions (open-ended) probed each element, allowing a pupil a score of 0, 1 or 2. The scores were thus treated as categorical data, and the less powerful non-parametric test (Chi-squared) that was consequently used meant that only strong differences and similarities were revealed. These limitations in experimental design arose from the experimental intentions, dictated by limitations of time and pupil access: these were not unlimited. Stage Two was designed to pull together the more significant and promising strands from Stage One, but at the same time to form a relatively brief

and self-contained unit that might summarise and round off the project. Five text features were focused upon in the single study - the alternative would have been a separate study for each of the five features, but, as explained, circumstances precluded this.

In summary, the results suggest that, for this experimental material, readers were not helped by a high density of supporting information; they were helped by deductive paragraph organisation, by explicit signal words, and by an initial gist summary. Sex differences emerged only for text density and explicitness of signal words: with girls being apparently more sensitive to variations in these features than were boys. The focal assumption, that less successful readers would demonstrate an ability to make use of the text features in a manner similar to that of their more successful peers made use of them, was supported throughout. The accompanying prediction, that these higher order skills would not be accessed when the text became difficult, found a measure of support in the areas of text density and paragraph organisation only. In the case of gist summary, it seemed clear that the least able readers made use of the summary even when the text was very difficult.

CHAPTER 6 DISCUSSION AND CONCLUSIONS

6.1 Stages 1 and 2: the combined results

The aim of these studies (see Chapter 1) was to try to add to our understanding of the processes of expository reading. Given improved understanding, the necessary task of developing expository reading skills at all levels of the school, and beyond, might then be more effectively addressed. The initial focus was upon all readers, both skilled and unskilled, male and female. As the studies developed, particular attention was paid to the processes of the less skilled, and how these might differ from those of the skilled.

The overall design involved two stages. The first stage, comprising ten separate studies, was intended as an initial experimental exploration of text features which had been identified as being of potential significance in the processes of expository reading. The second stage drew upon the insights and experience gained during Stage 1; it narrowed the focus of investigation, and allowed a more rigorous exploration in those areas that seemed potentially the most fruitful. As will be seen in the discussion which follows, there were areas where the two stages produced conflicting results. Where this happened, the analyst was faced with three possibilities:

- Both were valid measures of an important feature of text, and neither should be ignored; instead, the experimental material in each should be scrutinised in the hope of identifying possible reasons for the apparent conflict. This might involve refining the original definition of the targeted text feature.

- Only one of the conflicting results was valid; an attempt must then be made to identify the valid study, so that the invalid results may be ignored.
- The conflict cannot be explained; nor, with any confidence, can one study be favoured at the expense of the other. Then both sets of results would be deemed invalid.

The conflicts were not unforeseen (see 5.2.2), and two factors must be borne in mind when considering the combined results:

- Firstly, and very importantly, the textual circumstances of Stage 2 were not similar to those of Stage 1: the pieces of reading used to probe each text feature were very much shorter.
- Secondly, where there is conflict to be resolved, it seems probable that the Stage 2 material should be regarded as the more rigorous and dependable. In Stage 2, a conscious attempt had been made to accentuate the targeted differences between the matched text sections. Thus the results seem more likely to reflect those differences. Also, the relative brevity of the Stage 2 text sections allowed text sections to be matched with some considerable rigour - certainly with more confidence than at Stage 1, which was more exploratory in nature. In addition, the split design of Stage 2 allowed for an element of internal replication; except for the causal chain material, this internal replication did indicate valid material. Lastly, Stage 2 assessment made more rigorous demands of the readers: it used open questions to assess reader effectiveness; chance thus played a smaller part, and readers had to do more than simply recognise the correct response - they had to search, recall, and then generate a response.

6.1.1 Results from Stage 1 only

Some of the text features were explored only in Stage 1. In Study 1, sections of exposition, dealing with the operation of a simple mechanism, were embedded into quite extended pieces of narrative and exposition:

- overall, there were no significant results;
- girls recalled more from these expository kernels when they encountered them in a narrative setting; boys remembered more when they encountered them in exposition;
- there were no significant results by ability.

In Study 3, although this had not been the targeted feature, it was found that less skilled readers preferred shorter sentences, even where this was at the expense of signal words, a feature they do utilise.

6.1.2 Results from Stages 1 and 2 combined

(i) Text density.

Stage 1 (Study 2) found no overall effect and no sex effect. At Stage 2, however, an overall effect and a sex effect were identified: readers in general performed better with a low density of supporting information, an effect more noticeable among girls than among boys.

For ability, Stage 1 found, contrary to hypothesis, that good readers performed better with a high density of supporting information. The Stage 2 results ran directly counter to this, suggesting that good readers performed better with a low density. Examination of the experimental material offers no obvious explanation. The material at

both stages seems valid. For the reasons given above, greater confidence is placed in the Stage 2 material; but the results from Stage 1 cannot be ignored. The conflict can only, then, be resolved by pointing out the very different passage lengths and types. Accordingly, it is suggested that:

- where, as in the Stage 2 material, pieces of text are very brief, and consist of a single main point, there is strong evidence that the main point becomes submerged if there is a mass of supporting detail; recall is better if the paragraph is uncluttered, with the supporting micropropositions simple reworking and reiterating the main point;
- but where, as in the Stage 1 material, prose is extended, with a clear, coherent and sequential structure of well defined and clearly related macropropositions, there is a certain amount of evidence that skilled readers find the high level of supporting information helps them recall the macropropositions.

For skilled readers, then, the effect of supporting detail appears to depend upon the extent to which it may be distinguished from the main points that it supports. If there is too much of it, and too rich, it seems likely to submerge and overwhelm the main points. Given a sufficiently clear, robust and coherent structure of main points, plenty of supporting detail might be an aid to recall.

There was no evidence that unskilled readers were less able than skilled readers to respond to and draw upon variations in text density.

(ii) Deductive/inductive paragraph organisation

In Stage 1 (Study 7), there was some evidence that a deductive structure led to a better performance. This was confirmed at Stage 2.

Stage 1 suggested that girls were more sensitive to this variable than boys, but no sex difference emerged in Stage 2. It seems, then, that girls may be more sensitive than boys to this feature, but such a conclusion remains no more than tentative.

At Stage 1, the less skilled readers did not seem to make use of deductive organisation, though skilled readers did. Stage 2 confirmed this, suggesting that both skilled and unskilled readers made similar use of this text feature, though less skilled readers made less use of it when they found the text difficult.

(iii) Causal chain characteristics

The Stage 2 material was deemed invalid; thus the Stage 1 results stand: overall, dead end propositions are less well retained; there seems no sex effect; and, for the less skilled readers, the dead end material is more likely to be recalled than parallel causal chain material.

(iv) Explicitness of 'signal' words

Stage 1 (Study 3) did not control for sentence length: in the explicit material, sentences were very much longer. The only significant finding from Stage 1, then, that poor readers did better with the implicit material, must be discounted as probably invalid: it seems as likely that readers were responding to sentence length, not explicitness of signal word.

The Stage 2 results, then, stand: overall, readers performed better with signal words made explicit; girls seemed more sensitive to this

variable than were boys; and less skilled readers seemed to make use of this text feature in the same ways as the rest of the population.

(v) Effect of initial gist summary

At Stage 1, there was a general trend overall towards higher scores when there was no initial gist summary. In Stage 2 results, readers seemed to make successful use of an initial gist summary. The reason for this conflict, it is suggested, may be found in the very different text circumstances in the two stages. At Stage 1, the passage was long, and the initial summaries rather abstract and very dense. At Stage 2, the pieces were short and the summaries clear and simple. For this reason, and for those discussed earlier (see 6.1 above), the Stage 2 results can, it is felt, be accepted as a valid comment upon the effect of a simple gist summary at the start of a short passage; the Stage 1 results have to be rejected as questionable.

There did not seem to be a sex effect; and unskilled readers seemed to make the same use of the feature as their skilled peers, even when finding the material very difficult.

6.1.3 Summary of combined results

In short, simple units of text, a high density of supporting information seems generally to impede recall. Readers performed better with a low density of supporting information. Too much supporting detail appeared to submerge and overwhelm the main point. This effect was more noticeable among girls than among boys. With such text units, there was no evidence that unskilled readers were less able than skilled readers

to respond to and draw upon variations in text density. There was, however, some evidence that the effect of supporting detail might vary in different textual circumstances - for example, text length, or the ease with which the supporting detail can be distinguished from the main points that it supports. In longer passages, with conspicuous and coherent structures of main points, skilled readers appeared to find that plenty of supporting detail helped recall of the main points.

Deductive structure seems to aid recall. As with text density, girls appeared more sensitive than boys to this feature. Both skilled and unskilled readers make similar use of this text feature, though less skilled readers made less use of it when they found the text difficult.

Overall, dead end propositions are less well retained. There seems to be no sex effect. For the less skilled readers, the dead end material is more likely to be recalled than parallel causal chain material.

Overall, readers perform better with signal words made explicit. Again, girls seemed more sensitive to this variable than were boys. Less skilled readers seemed to make use of this text feature in the same ways as the rest of the population.

Short sentences led to a better performance among less successful readers, even where where this brevity is achieved at the expense of signal words.

In short, simple units of text, readers seem to make successful use of an initial gist summary. There is no sex effect. Unskilled readers seem to make the same use of the feature as their skilled peers, even when finding the material very difficult.

With three out of the five text features, girls seem to respond more sensitively than boys to manipulation of the independent variable. At no time was there evidence that boys were more sensitive to the text features than girls. Girls appeared to demonstrate better recall of factual material when encountered in narrative context, rather than exposition. Boys recalled the same material better when encountered in expository context.

Unskilled readers seem to make same use of the targeted text features as skilled readers - apparently these higher order processing skills are to be found in the repertoire of unskilled readers.

6.2 Contributions to our understanding of the reading process

Do these results have any implications for our understanding of reading? The results do not conflict markedly with the model set out in Chapter 2 - they are, for the most part, consistent with it.

In Chapter 2, reading was seen as a contractual, interactive process: the words in the text derive from the writer's knowledge structures, and interact with the reader's structures to produce for the reader a cognitive representation of meaning similar to that of the writer. The reader draws upon his or her repertoire of knowledge structures, or schemas, to construct this representation; he summarises its gist as he proceeds, and stores it in this gist form. Recall involves retrieval of the gist, and a process of reconstruction from it, drawing again upon appropriate schemas. Schemas develop out of the extensive accumulated experience of the reader. Each reader's schemas will be unique, and so each reader approaches what is offered by the

author in an idiosyncratic way, and interacts with the offerings to develop his own unique representation and understanding. Nothing in the results was inconsistent with this description of comprehension. The poorer retention of dead end propositions is consistent with such a model, and suggests that the findings of Trabasso et al (1984) for narrative text do extend to exposition: where comprehension was complete enough to allow the construction of an ongoing gist summary, this process excluded dead end material as irrelevant. Where, however, the reader is struggling, it is the deviant items that remained vivid (Graesser 1981, Sanford and Garrod 1981).

Looking more closely at how the model sees these knowledge structures operating, there are again no inconsistencies between the results and the model. Schema operation during reading proceeds at two levels. At a data driven level, a schema scans for images of its elements, seeking recognisable patterns among the input data; and, once instantiated, the schema's subsequent application is concept driven. It is the means of prediction, inference, connection and understanding. The schema inter-relates input information, structures it, generates inferences and expectations, and guides attention to significant elements, while highlighting deviant ones. A schema has an extended domain of reference, which allows reference to be made to entities not explicitly mentioned in the text. Primary processing occurs while the content of a text maps directly onto a schema. In the absence of this, an alternative schema must be found and instantiated. This is secondary processing. In the event of this secondary search failing, a temporary condition of 'hold-off' may exist until the problem is resolved. Beyond the mechanical aspects of decoding, this view of reading holds that similar basic processes are involved in listening, reading, and the other modes through which the world is interpreted. The results bore

this out, in that they demonstrated that, in general, an ability to make use of the targeted text features did appear to be part of the repertoire of both skilled and unskilled readers alike. They were being used in reading behaviour even where the reading comprehension itself was unsuccessful.

It seems unlikely, then, that effective use of the targeted text features are abilities unique to reading. They cannot be 'lower level' decoding skills; they must be general discourse processing skills, competencies common to discourse processing in general (Sticht et al 1974), and, as such, skills of a higher level. This lends weight to this idea of a fairly powerful 'general language factor' (Neville 1988, Mulholland 1985). Mulholland (1984) points out how poor readers rely too much on their own processing rather than visual input - the results here support the model implied by this, in that the skills and strategies for top-down processing do appear to be part of the repertoire of all readers, skilled and unskilled.

In any schema-based model, it is assumed that many schemas are in use at any one moment of reading, interacting vertically and horizontally at every level of cognition. Top down, concept driven activity eases processing by making available structures into which the incoming information may easily be integrated, minimising demands on working memory. There is constant vertical interaction: from bottom upwards, as each subsequent level attains positive goodness of fit, it activates still higher levels of schemas, combining ever larger units of meaning. Each then activates its own sub-schemas, top down, further to constrain lower level processing. Higher level schemas act to constrain the interpretation of input information - thus the more that is known about a subject the more effectively it may be processed. More skilled

readers are better able to utilise schemas at the lower levels of processing just because they have managed to reach the higher levels: these then 'downwash' to make more effective the lower levels of processing. The results are fully consistent with this. Reader responses to deductive paragraph organisation, and to the presence of an initial gist summary, seem to confirm the suggestions of Kieras (1978) and Graesser (1981), that top down structures help processing, presumably by providing a binding theme that allows incoming information to be integrated more easily.

Looking at the more bottom-up processes, the preference for shorter sentences among readers who were struggling is consistent with the model. Long sentences are demanding upon cognitive resources. Many sophisticated readers will have experienced the frustration that can be felt towards the end of one of Henry James' more extended sentences: at least one re-reading may be necessary before its different parts can be connected successfully and inter-related. Similarly consistent is the preference for explicit, rather than implicit, signal words.

There was, however, one area of inconsistency between the model and the results. The model suggested that depth of processing should correlate with recall; that is, there was an expectation that the more a reader put in to the business of processing the text, the more he would recall from it (Black and Bower 1979, Craik and Lockhart 1972, Cermak and Craik 1979, Schnotz 1984, Voss and Bisanz 1985). This expectation informed the thinking behind some of the Stage 1 hypotheses: in Study 4.4, for example, it was hypothesised that successful readers would benefit from having a fairly heavy inferencing load, but they did not. The text density results also ran, in part, counter to this expectation. Voss and Bisanz (1985) made an explicit general prediction that the

presence of supporting subordinate detail would aid recall of the superordinate content. The density results ran counter to this for short text segments, although it was supported, among more successful readers, for longer and well structured pieces of text.

The model, however, did not claim that schema theory could be seen as a complete explanation of the problems of learning from reading. The ideas put forward by Spiro et al (1987) represent a possible step forward: most processing is seen as depending, not upon neatly packaged knowledge structures, but upon 'ill-structured domains', syntheses of partial and fragmentary knowledge structures. The reader must traverse the multiple connections and pathways of the 'landscape' thus constructed until thoroughly familiar with it; only then, will it provide an effective means of processing. Perhaps reason can be found here for the anomolous text density results: the experimental material tended towards an attributive structure, with an assembly of short expositions, each dealing with different aspects of tribal life. Perhaps, in a processing task such as this, where the gist that is stored has to consist of a sequence of macropropositions that are not causally related, that are related only through their common topic, subordinate detail that would be helpful in another context becomes unhelpful, and has to be excluded from storage.

The results by sex cast little new light. Girls were not overall more successful than boys. This can perhaps be attributed to the expository nature of the text: Study 1, in Stage 1, suggested that girls, unlike boys, operated more effectively when reading narrative rather than exposition, and this material was expository. Also, these pupils were approaching the age by which the girls' advantage was no longer a significant one.

More interesting, and potentially revealing, was the way in which girls appeared more sensitive than boys to variations in some of the target features. Neville (1985) and Mulholland (1985) found reason to suggest that the processing of girls might be characterised by its 'careful and constrained' nature, while that of boys might tend to be more 'confident and careless'. These results are consistent with such a finding.

But the central preoccupation of Stage 2 concerned the nature of the impediments that hindered less successful readers: were they located among the lower order decoding skills, or were they to be found among higher order processing skills common to other types of discourse? In reading, the skills and schemas involved, simultaneously and at all levels, are countless. Stage 2 focused upon just five features which arguably involve higher level processes. It paid no attention to the many others, and there is no certainty at all that what holds true for these five, holds true for others. But, for these five, the results suggest that they were higher order skills that lay within the repertoires of the less skilled readers. By implication, the reasons for failure lay elsewhere - perhaps their undoubtedly limited lower order skills.

The model outlined in Chapter 2 offered a number of explanations of reader difficulty. It was suggested that poor readers generate fewer hypotheses; they may call forward irrelevant structures, or relevant ones of poor quality and specificity; they may have an appropriate structure, but poor access to it; they may deploy too many structures at once, or there may be no appropriate structures available. They are, it was suggested, often unwilling to change structures, even where the one in use is patently unsuitable, and often this is compounded by there

being too little attention to spare for the deeper levels of processing. Paradoxically, poor readers may rely more on their own processing than upon the actual visual input; to put it another way, they do make significant use of a macro-structure, but it is a flawed and shifting one, often bearing little relation to the text. They may also be poor scanners, and make little use of peripheral information. The suggestion was that it is as much an unfamiliarity with the nature of written discourse as purely mechanical problems with the processes of reading that cause the problems: the problems remain even if the text is presented orally. The difficulty can lie, it is suggested, not only with an inability to deploy higher level skills, but with an inexperience with literate language (Neville 1988).

The results did not conflict with this. Their real significance, though, lay in the way that poor readers were shown to respond to the targeted text features in ways broadly similar to those of skilled readers. In Chapter 1, it was said that the studies sought to make some contribution to our understanding of the reading process when the reader is confronted by expository text. That contribution must stem from this insight: that those pupils who do not cope well with expository text - that is a great many pupils - do not appear to fail among the macro-structures. If text can be deciphered, and its language and style is familiar, it seems they can cope with the macro-structures, and deploy higher order processing skills. By implication, they fail elsewhere. By implication, it seems likely that poor lower order skills make significant contribution to that failure.

6.3 Implications for the classroom.

The discussion so far has drawn heavily upon the schema-based reading model outlined in Chapter 2. It is a psychological model. The emphasis of the discussion has thus been based on cognitive psychology.

But the project was carried out by a practising teacher, in response to practical reading problems. It arose from the frustrations that these problems caused to subject teachers in the delivery of the everyday curriculum. Furthermore, it was based not in the laboratory of the cognitive scientist, but in the classrooms of ordinary schools; it was a venture shared between pupils and teachers well familiar with one another, and in a familiar context. Texts were used that reflected typical school text. All of this was intended as an important strength of the project: it was hoped that there would be an ecological validity within such a situation that might go some way to offset the uncontrolled variables that cannot be avoided once the investigation leaves the security of working with short text segments in tightly controlled experimental settings, and instead seeks to probe typical texts in everyday settings.

In Chapter 5, when just five of the ten targeted features were chosen for further study, and a decision was made to focus upon the differences between successful and less successful readers, the original objective, of a relatively unspecified contribution to our understanding, was refined and developed into a threefold intention. It was hoped:

1. to discover how certain features of expository text affected readers, particularly those in difficulty;

2. through this, to consider at what level of processing the main impediments to successful expository reading seem to be located;
3. and from this, to consider the implications for the ways in which we might intervene, to lessen the difficulties.

The first and second have been discussed. The third, and in practical terms the most important, remains to be considered. It is hoped that the studies' findings do have a contribution to make to the debate about how best to help readers in trouble, particularly in the reading of expository text.

6.3.1 Teaching methods - the debate

Mention has been made of the distinction between macro- and micro-levels of processing (see Chapter 2, Section 2.4.5). The two, it is suggested, should be viewed as involving separate skills (Graesser 1981, Pearson and Camperell 1981, Mulholland 1984). To some extent, the debate about teaching reading can be similarly dichotomised, with claims for the optimum teaching methods endlessly contested between protagonists from each extreme.

Donaldson and Reid (1985) map out the ways in which current positions have been reached. For a long time the prevailing notion was that the primary skill lay in seeing how marks on the paper differed from one another, and in being able to utter the speech sounds they 'stood for'. The notion of context, while sometimes invoked, was left vague and unanalysed. 'Reading for meaning' was seen as desirable, but meaning was seen as coming by way of the spoken word, these having acquired meaning previously, when oral language was being learned. The behaviourist tradition, still dominant throughout the fifties, explained

the links between words and meaning by 'association'. The focus was thus atomistic, concerned with single words and small units of meaning. It seemed common sense that the right way to learn words was one at a time; 'the business of reading a string of words put together to form a sentence should present little or no extra difficulty' (p.13). As Donaldson and Reid point out, it says much for the power of theoretical assumptions that such a belief should persist so long.

The theoretical change that allowed a new view of reading arose from a number of sources. Donaldson and Reid note specifically the work of Piaget, Bruner and Chomsky: all, in their various ways, stressed the 'constructive, hypothesis-testing, rule-generating nature of human thought' (p.13). Chomsky's interest was in what the child might be doing by way of actively formulating and testing grammatical rules; when this preoccupation was at its height, in the late sixties and early seventies, more attention was paid to the structure of utterances than their meanings. Then came the view that, instead of a specific predisposition to acquire language in an ordered way, children learned language precisely because they tried to make sense of all situations. From non-linguistic contexts, they infer the linguistic meanings. Language is embedded in its context (Donaldson 1978). People do not interpret what words mean - they interpret what people mean when they are using words.

From this arose the realisation that young children may have little awareness of the existence of separate words. Their linguistic awareness in general is often very limited. Donaldson and Reid (1985) use a helpful metaphor: language is something they 'see through' to get the meaning; it is not opaque, so it cannot be 'looked at', and turned into an object of study. If this is so, it has obvious implications for those

who would encourage reading among the linguistically immature by asking them to focus upon units at the sub-word level. Some young learners might find this initially conceptually incomprehensible. Hawkins (1984) points out that 'the written form of English causes shipwreck for a large part of the school population' (p.2), and recommends that 'language awareness' courses should become a specific element of the curriculum. There does not appear to have been much sympathy for such a response. For all the reasons argued by Donaldson and Reid (1985), it must be more valid to seek to develop language awareness in the contexts where it is naturally encountered. Hence the Bullock maxim: 'Every teacher is a teacher of English'.

Donaldson and Reid (1985) speak of two educationally misleading assumptions. They argue that we do not learn to read in a way that parallels our learning of oral language. Further, they make the point made elsewhere (e.g. Mulholland 1985, Neville 1988) that the language of books is not just oral language in a different medium. Print is disembedded, and the reader has to rely on it alone. As with all other forms of mental activity, they must proceed through hypothesis, inference and prediction; but the interaction is between two entities only, the content of the page as mediated by the marks on the page, and the content of their own past experience. Unlike oral dialogue, there will be no clues from the existing physical context. Hence the reader has to deploy the same kinds of skills as he employs in making sense of other aspects of the world, but has to do so within a context that, to begin with and for the unskilled reader, is unusually constrained and limited.

To exemplify the sharp division among reading teachers, Donaldson and Reid take a sample error: a child looks at the words 'bread and

honey', and says 'bread and jam'. Clearly, the child is making sense of the written message, building upon an initial graphic input by combining her knowledge of sentence structure with her knowledge of what often goes on bread. Some would see this as hardly an error at all (Smith 1978, Goodman and Gollasch 1980). It is a 'virtuous error', a manifestation of reading as a 'psycholinguistic guessing game' (Goodman 1969). Close attention to detail when perceiving the page is not seen as a desirable feature: minimal attention should be paid, enough only to provide a basis for those processes of ongoing hypothesis and prediction that dominate all our attempts to make sense of the world. Others, including Donaldson and Reid (1985), acknowledge the central role of such hypothesising, and accept that reading involves the construction of meaning, but feel that such looseness is not in the end helpful: 'One of the main things about written language is that it enables us to be precise; and it does this partly because it preserves its message intact through time, and unchanged in spite of being passed from one recipient to another' (p.18). They go on to speak of how the precision of the written word has allowed human learning to be disciplined and systematic. With such a view, detailed attention to print cannot be relegated to the periphery. Precise and thoroughly competent decoding becomes an essential feature of the reading process.

This discussion has used terms such as macro- and micro-processing, and higher and lower order processing skills. As suggested, the debate about teaching reading has clustered around these same distinctions. On the one side, there are those such as Smith and Goodman. On the other side, there are today probably no serious commentators who would advocate teaching or remediating reading with the emphasis on print recognition skills alone (though there may well be classrooms where such an approach appears to linger on in practice). In

the middle ground, will be those such as Donaldson and Reid, and very many others. With such a viewpoint, the teaching of reading will not neglect or under-rate the role of macro-processing, and the higher order processes that the reader brings to bear. They are central. But nor will it under-rate accuracy and competence at the micro-level, the lower order skills. Poor readers characteristically rely too heavily on context, a context often only imperfectly grasped. Help must be given at the lower level, 'not by removing context; rather by finding ways of keeping it present while the powers of perceiving what is on the page are strengthened' (p.21 Donaldson and Reid 1985)

Bullock (1975) came to a similar conclusion: that to embrace either extreme is to do a disservice to the learner. The implication was that successful teaching should be eclectic and varied: as well as drawing sometimes upon methods with top-down emphases, and sometimes upon those with bottom-up emphases, intervention should draw upon the understanding that successful reading involves a dynamic, constant and balanced symbiosis between the two. Reading instruction, including intervention techniques, should reflect this: 'The matching of sounds and symbols is of critical importance... (but) it should take place in the context of ...reading for meaning.' (p.521)

6.3.2 Teaching methods - what these results suggest

The results of these studies, limited in scope though they were, offer no evidence of a macro-processing deficit, per se, among unskilled readers. It seems probable that their undoubted lower order deficits were at least a major contributing factor in their failure.

Many of the foregoing ideas (6.3.1) were developed in relation to the needs of beginning readers. How should they be applied to older, failing readers? Traditionally, remediation has centred firmly upon a perceived deficit in micro-processing. This has meant a focus upon linguistic processing, and lower order skills, and those alone. But quite apart from the points made above, such a focus seems questionable, in light of the ways in which bottom-up and top-down processes interact during reading. Effective low level processing might be the aim, but effective low level processing depends much upon 'downwashing' help from success at higher levels (Graesser 1981, Garrod 1984), and this makes a nonsense of a focus upon low level skills in isolation. The more that is known at the macro-level, the more 'closed' and effective becomes the schema operation at micro-levels. The reader who has realised that the passage is about schools will waste less effort in completing the word 'tea.....' as 'teacher' than will a reader without this realisation.

Our traditional remediation emphasis has been at the micro-structure level. The failing reader is helped and trained to get the small detail right, on the assumption that the bigger issues will follow unaided. We have responded to global incomprehension by emphasising units at word level or below. This is clearly inappropriate, even where, as suggested by the results of this study, it is at the micro-levels that the difficulties do occur. Arguably, while it is accepted that the skills of macro- and micro-processing should be seen as separate skills, it is almost meaningless to attempt to consider either one of them in isolation from the other. A schematic interaction perspective makes clear that attention to macro-structures is not only an essential feature of reading in its own right; it offers direct support to that other essential feature of reading, processing at micro-levels. As an essential part of developing precision at the lower levels, readers

should be encouraged to see, and practise seeing, the text as a whole, encouraged to generate expectations about every aspect of the text, its content, structure, organisation and style. Such a macro-structure grasp would downwash to aid those very microstructure variables we wish to develop.

To recapitulate, the evidence from these studies suggests that it is the micro-level skills that need developing. The main stumbling block, for the unsuccessful readers in this population, with this experimental material, did appear to be located at the level of their microprocessing. Certainly, it does seem likely that many school pupils are woefully unfamiliar with the conventions and structures of written language, but in these studies their macroprocessing, as reflected by the use they made of the targeted text features, was broadly similar to that of the skilled reader. At the same time, for the reasons discussed, attention to micro-processing skills in isolation would be unhelpful.

In view of the above, intervention should address both macro- and micro- processing simultaneously. Poor readers do need macro-processing experience with expository texts, using the kind of highly effective practice described by Lunzer and Gardner (1984), with their 'Directed Activities Related to Text'. But the purpose must not be to develop higher order skills only; techniques must be found that allow simultaneous development of lower order skills, the decoding of print.

Certainly, pupils whose skill with expository text is limited should read texts that are simple in terms of sentence length, vocabulary, and familiar language forms, but not conceptually arid - that is, a textual form and style which they can handle confidently. But this is advice appropriate to the writers of books, or for the guidance

of buyers. It recommends avoidance of the new and unfamiliar. It begs the question of introducing the uncertain and less skilled reader to less familiar forms and new styles - of familiarising them with school texts as they are. Something is needed which will expose to the new without allowing that exposure to set them back.

A number of classroom approaches suggest themselves. The critical criterion is that they allow practice at the lower levels while seeking to reduce uncertainty at higher levels, so that these higher levels may simultaneously be developed, and make their contribution at the lower level.

Obviously, any activity that allows the reader to become familiar with the topic before reading will be helpful. A topic that has been encountered through discussion, film, talk, video, poster, or more familiar reading genres, will be less daunting when encountered in expository prose. Some of the macro-structure spadework will have been done, bringing the 'downwashing' advantages of macro-structure mastery, while freeing more of the reader's attention for his struggle with the micro-levels.

Conscious and deliberate nurturing of linguistic awareness should also be helpful: the reader who is forewarned of the difficulties may be less deterred by them. In an environment where such awareness is fostered, language will become 'opaque' (Donaldson and Reid 1985), and pupils in difficulty may be able to stand back from it, and consider it dispassionately. They might be able to benefit from structural and stylistic comparisons with other pieces recently read. Again, by smoothing the way among the macro-structures, the required development of the lower level skills should be facilitated.

This is the central theme of the argument being presented: the two levels of processing must be attended to simultaneously. Perhaps the most obvious mechanism that allows this is for the reader to listen as he reads. Here the voice provides intonational signals of meaning to help understand more complex language and style. The macro-structures are presented through a medium that is far more familiar than text alone. Decoding difficulties are solved even as they arise. Neville (1988) is referring to this when she advocates opportunities for children to listen to tapes and oral readings to familiarise them with more unusual, and thus difficult, language forms. Neville and Pugh (1982) speak of the value of varying the delivery speed of the taped material in these 'listening-while-reading' techniques. Clearly such exposure is valuable either alone, or as an accompaniment to reading. The listening is valuable in itself; there is no shortage of evidence for the ways in which the processes of listening and reading overlap and support one another (Blank 1985, McInnes 1985, Neville 1988)

Perhaps there are implications for the rather discredited practice of 'reading around the class', or at least the following of the text while the teacher reads aloud - the reading must be fluent if the listener/reader is to benefit. This has remained a familiar feature of the English classroom, where the intention has been one of communal involvement in a shared stimulus, a shared aesthetic experience. It is, too, a necessity where poor readers are members of a mixed ability class (Lennon 1989). Perhaps it has a place in other classrooms too.

Certainly there are implications for such techniques as 'paired reading', currently enjoying renewed attention. It has been the subject of a number of positive recent reviews (Topping 1987, Morgan and Gavin 1988, TESS 2/9/88). It applies only to one-to-one teaching settings, and

has thus focused on readers whose failures are marked enough to bring them to the attention of the remediating agencies. Typically, it involves parents. It may equally well involve siblings, peers, or teachers. Very simply, in paired reading the unskilled reader reads aloud, and is supported by a skilled reader who reads very quietly and not quite simultaneously, lagging fractionally behind the skilled reader. On encountering a difficulty of any kind, the unskilled reader has to wait only a fraction of a second to have it resolved, in a way that offers no interruption to the emerging flow of meaning. Its theoretical strengths are considerable and obvious, for all the reasons that have been discussed. It is increasingly well tried and familiar. Also, failing readers seem to enjoy it.

The foregoing arguments and suggestions are developed out of the results of the studies. But they can do no more than offer some direction; in no way can they be taken as a blueprint for remediation. Neville (1988) makes this point with characteristic directness: 'By the time children of age 12-13 reach the secondary school, there is no more time for a vague "suck-it-and-see" approach to remedial teaching. What is needed is diagnostic testing to find out exactly what reading behaviour, or lack of knowledge, is causing most problems, so that the very precious teaching-time is not squandered, but attacks as soon as possible the precise areas of confusion and difficulty.' (p.214). There is no time, either, for evangelists with simplistic cures. The suggestions made here do not stand in lieu of precise and careful diagnosis; they do no more than confirm and develop the framework of knowledge upon which such diagnosis and intervention depend, and perhaps offer some insights to the subject teacher about some of the ways in which some of the expository text central to his subject may be rendered more accessible.

6.4 Implications for further research:

In one way, the results of the studies suggest a note of caution about the testing of reading. The test material was extensive and rigorous, and the results often decisively significant. Yet the analysis of the results called on occasions for the resolving of apparent contradictions. In the process of resolution came further realisation of the myriad complexity of comprehension, and of the enormity of the numbers of variables that might affect it. Had the testing been less extensive, these contradictions might not have emerged. Their emergence serves as a reminder that, even with good tests and decisive results, the analyst should be most cautious about generalising from the results, particularly with restricted samples of both subjects and materials. A text and some questions seems the most obvious way of probing comprehension, but it is clearly a most imperfect way.

Beyond this, there were some shortcomings, apparent in retrospect, that should be avoided, as far as is possible, in any further developments based on the research.

Some of the text material, while intended as typical of the classroom, might be criticised as showing a sex bias, tending to cast males in the dominant roles. It may be that such a bias might affect the comprehension and responses of the girls among the experimental population. The experimental material leaves scope for improvement in other ways too. At Stage 2 too much was probably attempted within the one test: the targeted text features could usefully have been examined more extensively. Possibly, too, the gradient of difficulty between simple and normal level material should have been more pronounced. The text material, though arguably typical enough of school text, was a

rather tedious and somewhat tenuously connected list of paragraphs. Thus the results are probably valid for that test text; but, as with all tests of reading comprehension, there is no reason to assume that the results would be replicated using other text types, or with other samples of pupils.

The study did not take into account individuals' learning styles and strategies, although these factors are known to influence reading performance; the purely experimental approach that was used, based around certain expectations of particular text features, is by nature a fairly limited approach. The understandings that preceded the experimental work arose solely from a theoretical base. Some case study exploration, to flesh out and develop the insights gained from the chosen theoretical base, would thus be valuable. Such a case study stage, probing a range of text types, and using such exploratory techniques as interviews, recall protocols, and analysis of test responses rather than their scoring, would perhaps throw further light on the results of the experimental phase.

Nevertheless, as implied at the beginning of this section, the achievements of these studies took perhaps two forms. As had been hoped, they did appear to further our understanding of reading failure. They also helped to illuminate the extent of the difficulties: the same light that perhaps showed a little of the way forward showed too just how many are the hazards along the way.

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Expository Reading In Schools:
the Nature of the Reader's
Difficulties

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School of Education
The Open University

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VOLUME TWO

Note to readers:

In the experimental material shown in these appendices, some of the texts have been annotated, in order to make obvious, at first inspection, targeted differences between pairs of texts. This has been done by underlining the relevant fragments. The texts have been presented in this way only in those cases where it seemed the best way of making the differences obvious. In some cases this has not been necessary - the differences are obvious enough without such an aid, or they have been highlighted by presenting part of the template from which the passages were constructed.

The reader is reminded that the experimental population did not encounter the texts in this form.

APPENDIX ONE.

**Experimental material from
Study One.**



Frontier! Life in a Border Castle 400 years ago



Frontier! Life in a Border Castle 400 Years Ago

The border between the two countries was a long one. For hundreds of years the fierce tribes from the north had attacked across it. Then, about four hundred years ago, the King had ordered a line of castles to be built. The castles guarded the border against attacking tribes. It was wild countryside. Few people wanted to live there. It was dangerous. Life would be hard for the soldiers and their families in the castles. So the King paid them well, in silver and in land. The castles were about fifty miles apart. The Captain of each castle was given all the land around, for twenty five miles each side. He was Lord of all this land. Also, all the land he could take in war from the northern tribes would be his. So he wanted to fight against the tribes. By fighting, he could become rich and great.

This solved the King's problems. It made his wild northern borders safe. Between him and the savage tribesmen were the Lords of the castles. They were strong and fierce, these Northern Lords. Their lives were often dangerous. And their lives were always hard, the castles being built on the tallest hilltops of the wild countryside. From these cold hilltops, they could watch for their enemies from the north. They could attack, or draw back into their castles when they were attacked. The castles were strong and safe. But they

were not comfortable. Apart from the Captain and his family, there would be perhaps a hundred soldiers. Many of these had families. It meant that the castle was crowded. As well as soldiers and their families, there were all the other people a castle needed. People like cooks, armourers, servants, stable boys and blacksmiths. It is easy to imagine the scene in these old stone castles, perched upon their hilltops. Imagine it was winter. Mist drove in from the north, swirling round the stone battlements, making the sentries shiver miserably. Behind them, as they stared north into the dangerous mists, was the castle courtyard. In the middle was a tall stone tower. This was called the Keep. The Captain and his family and servants lived in the Keep, and it was the castle's strongest part. If the outer defences fell, the soldiers would draw back into the keep, and fight on from there. Everyone else lived in low stone buildings round the inside of the castle wall. These buildings were not comfortable. As well as sleeping quarters, there were kitchens, storehouses, stables, workshops, kennels and pig-sties. Rubbish was thrown over the wall, and at night, when the drawbridge was up, no-one could enter or leave. It was worst when the great castle was being attacked. Attacks could last for days. Or weeks. There was not much real danger. The castle, with its great drawbridge and stone walls, was very strong and had food enough for months. But during a long attack, it was cramped,

cold, and most of all, smelly.

Still, it was safe. Thick, high walls and a heavy drawbridge lay between the attackers and defenders. The attacking tribes outside could not win. It was hopeless. The castle was too strong. The drawbridge was made of heavy planks. A water-filled moat surrounded the castle. The drawbridge lay across it. Two big wheels pulled the chains that raised the drawbridge. The wheels stood inside the gate, one on each side, and the chains went up through holes in the wall above the gate. Turning the wheels pulled the chains. As the chains were wound in round the two wheels, the drawbridge swung up. Each wheel was fixed to a great wooden post, on a long iron handle that passed through the post and turned the wheel. It was heavy, and raising the drawbridge needed five strong men on each handle. Heavy rocks stood nearby. When the drawbridge was up, a heavy rock was jammed in under each wheel. This 'locked' the wheels and chains, keeping the drawbridge up. To lower the drawbridge, five men took each handle again. Then the rocks that had jammed each wheel were dragged aside. The great wheels were turned, slowly unwinding the chains again. As the chains unwound, they slipped out through the holes above the gateway, slowly lowering the heavy drawbridge. The job of the five men on each handle was to stop it running out too fast. The drawbridge was

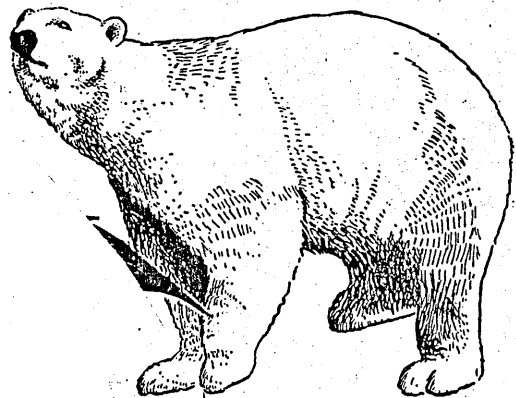
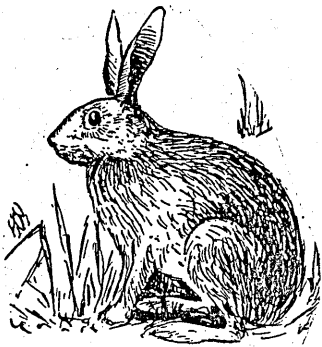
had

heavy. So the rocks used to jam the wheels were large. They had to be, to jam the wheels firmly. They were wedged into place with sledgehammers. Moving them clear needed crowbars. But they did the job. It was a rough, simple system, but it worked. The castle walls were too high to be climbed. They were too thick to knock down. From the tops of the walls, the defenders could fire arrows down on to any attacker who came close enough. The savage tribesmen of the north had no great catapults to batter down the walls. They could only rush at the walls with their swords and spears. And of course, they were always beaten back without difficulty. Or they would camp around the castle to starve it out. But always help came in time, long before the defenders' food supplies ran out. The next castle was only a few days march away.

Only once did one of the Border's castles fall to the enemy. When it happened, the attacking tribesmen killed everybody. Killed everybody except two men. Because these two men, two of the defenders, were really on the side of the attackers. The attackers had not won in a fair fight. They had won by trickery. Or so the story is told. At night, the two men had crept across the courtyard with two horses. They had harnessed the horses to the rocks jamming the drawbridge wheels. They had dragged the rocks away with the horses. Suddenly 'unlocked', the drawbridge ran out

with a great crash. The waiting tribesmen poured in over the splintered, ruined drawbridge. They butchered everyone, confused soldiers and terrified women and children. According to the old story, the moat ran red with blood. It was a cruel and terrible night. When the killing was done, the tribesmen disappeared. Quickly, more soldiers were sent to the castle. It never happened again, and the border stayed safe. But people remembered that night. Often, it made them nervous during the cold, dark winters. When the northern tribes were restless, the soldiers in the castles became restless too. They remembered the stories, and watched each other nervously. It didn't need much. Just two men, who seemed to be friends, but were not. Would it happen again, that terrible slaughter ? But the murderous trick was not repeated. For another hundred years, the border stayed safe, and the kings in the south stayed strong. They thought they had nothing to fear from the north. But as the years passed, things slowly changed. The great Captains and Lords of the North had become powerful men. And instead of defending their King in the south, they turned against him. They made peace with their old enemies, the northern tribes. They joined forces with each other, and turned south. Again, battles were fought in the Border hills, and this time the enemy was the King and his armies. Loyalties changed, but little else, and life in the castles went on as before.

The Tuken's: a Trapping Tribe in the Far North



The Tukuens: A Trapping Tribe in the Far North

The land where the Tukuens lived was a hard land. Forest stretched for hundreds of miles. There were many lakes, and everything was covered in ice and deep snow for many months each year. It was too hard for farming, and only trees and rough grass grew well. An empty land. But not quite empty. In the scattered clearings of the great forest lived small tribes of hunters and trappers. Their tiny villages were many miles apart. The life of these people was hard. One such tribe was the Tuku tribe, living in the forest clearings round the edge of Lake Tuku. During the summer, they hunted. They hunted bears, hares and foxes, and fished the lake and rivers for salmon and trout. Unlike many hunting tribes, they also kept some pigs and hens. These helped in winter, when hunting was bad and food ran low. Some of the fish and meat from summertime was kept for winter. It was cut into strips. These were dried in the wind and sun. When dried, they could be kept for months. But still, some freshly killed pork or chicken made a welcome change. During the winter months, there was little hunting. The cold drove many animals away south. The bears all slept through the deep, frozen winter. Thick ice prevented fishing, and for most of the winter, only the fox could be hunted.

The villages were very small. Quite often, there

were no more than four or five families in each village. Each family had its own small, wooden house. So each village had only four or five houses. They stood in little groups in the forest clearings, close to the lake shore. Behind them, the endless forest stretched as far as the eye could see. The lakes and rivers were the easiest way to travel, easier than the forest. In winter they froze, and the Tugen hunters could walk easily across the ice to visit their traps. In summer they used canoes. They fished from these little boats, and paddled across the lake and up the rivers to visit their traps. They used their canoes, too, when they took their loads of furs to the trading post to sell. Mostly, they used the money to buy hunting knives and rifles, and fishing lines and hooks. Their little wooden houses were very simple inside. There was just one room. The whole family lived in it. Even the pigs and hens. An open log fire in the middle of the room was used for cooking and heating. The room was hot and smoky, summer and winter, with bare earth floor and log walls. Life was very hard.

Fishes and hares were hunted for food, and a lot was dried and put away for winter. Bears were hunted for their meat, and their thick furs, which were very useful. Not foxes. The Tugens did not eat foxes, or use their furs. But they did sell them. White fox fur was very valuable. Northern foxes are brown. But they

change to white in winter. Then they are worth hunting. Tugen hunters hunted these white foxes all through the frozen months of winter. They used traps. The trap was a simple box made of wire netting. It was long and narrow. At one end was a sliding door. The door slid up and down. It was held up by string. The string held it so that it hung above one end of the trap, ready to drop and close the trap. If the string was let go, the door slipped down and the trap closed. The string was important. One end held the sliding door up. The other end led to the back of the box. It went down through the back of the box to the floor. The end of the string was looped over the corner of the bait tray. The bait tray was a tray hinged to the floor. It was at the far end of the box from the door. When the bait tray was lying flat on the floor, it held the string in position to keep the door up and open. When the weight of the bait was taken off the tray, the tray flicked up and let the string go. The bait lay on the tray, and had to be heavy enough to hold the tray down. A freshly killed chicken was good bait for a fox. The fox smelled the bait. It went in through the open end of the box. It took the bait off the tray. That let the string go. The sliding door fell down, and closed the box. The fox was trapped. Each hunter had two or three traps. They set them in the forest around the lake edge in the early evening. That was when the foxes were looking for food. On each bait tray they put a newly killed chicken as

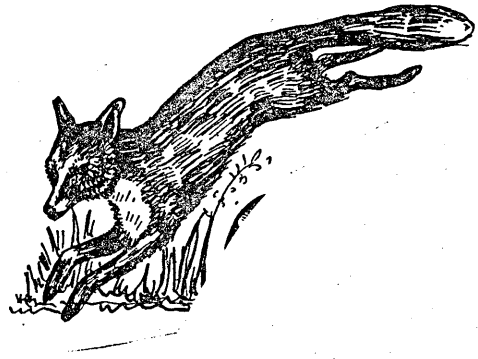
bait for the fox. The hunters came back to check their traps next morning. If the bait had not been taken, the hunter took the dead chicken back to the family house again. It was frozen solid, and had to be thawed out. Then it could be used as bait again, and again, if needed. But often it worked, and a white fox was trapped.

The furs of the white fox were very valuable. Fur traders paid very high prices. The Tuken huntsmen were careful with their money. They bought guns for hunting, and lines for fishing. But also they bought chicken food, and sometimes young chicks. They sold the fox furs for much money. But the chickens were valuable too, as food and as bait. And sometimes, somehow, foxes escaped with the bait.

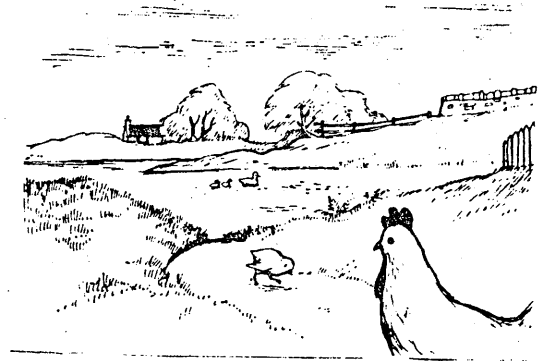
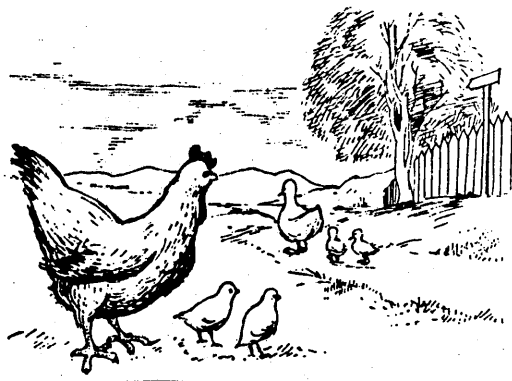
No-one knew how this happened. There were many different stories of course. Some hunters believed that the hinge on the bait tray froze solid. That would let a fox lift a chicken off the tray without the door sliding down. Other hunters were more simple folk. They believed in magic, and strange gods in the forest. Perhaps the dead chickens came to life, and flew out of the trap ? Perhaps sometimes the white foxes themselves were magical ? A magic fox could eat the bait and still escape the trap. Whatever the reason, sometimes foxes did escape with the valuable chicken. Losing a chicken

this way was serious. During these long, cold months of winter, hunger was never far away. Each hunter had a whole family to feed. If the summer hunting had been good enough, there would be dried fish and bear meat. And there were always the chickens and pigs to be killed. But sometimes hunting was not so good in summer. Then winter could be difficult. The family might starve. Then, of course, the fox furs were even more important. The money the Tuken hunter got for his furs would be spent on food for his wife and children. So when a fox stole a chicken from a trap, it was serious. The hungry family lost both food and fur. Winter lasted for eight months each year. When a bad winter followed a poor summer, every village lost some people. Usually the old and the weak, but sometimes a whole family.

The story of the Tukens is a story of struggle for survival. A struggle that they have won so far, surviving against heavy odds. And a struggle that they will, hopefully, go on winning.



The Carry Out



The Carry Out !

He was a big fox. His brown coat hid him well. He lay low in the long grass at the edge of the woods, watching the farm carefully. Among the trees and brown fallen leaves he could hardly be seen. He was hungry. Nothing seemed to be moving. Smoke rose thinly from the farmhouse chimney. He could hear music from a radio somewhere. His nose twitched eagerly at the smell of chicken that came from the long, low shed nearest him. Everything was quiet, but he was uneasy. He knew The Man was there somewhere, watching, waiting, wanting to kill him. Four chickens in four nights, the big fox had taken. After tonight, he must hunt elsewhere. The Man was clever and angry, and the big fox knew his luck could not last. Death by the gun, or trap, or poison, waited for him. If he was careless for a moment, there would be no second chance. He thought quickly of his cubs, waiting hungrily in the lair by the beech tree. A pigeon landed in the branch by his head. It flew off, startled, as the fox rose, a swift, brown shadow. He paused for a moment, then set off, running silently along the edge of the plough. He must get downwind before approaching the farm. Tonight there was danger. He knew it, but his young must feed.

The farmer whistled quietly to himself as he took his coat from the wooden peg by the door. Tonight he

would get that fox. He was sure of it. During the afternoon, he had driven over to Ferguson's place at Bain Bridge, and borrowed a new trap. It was simple but effective. Jim Ferguson had got three foxes with it, and now they stayed away from his place.

"Won't be long, love," he called to his wife. Pulling on his jacket, he crossed the yard to the shed by the paddock. It was nearly dark now. He paused to watch the moon rise over the wooded hill to the east. The night was quiet. The only sounds were the radio from the kitchen, and soft, warm noises from the cattle in the barn. There was a breeze from the south. The smell from the henhouse was not so strong now in the yard. He smiled grimly as he opened the shed door, and shone his torch on Ferguson's trap. One more chicken must die, but that would be the last for this fox. By morning, he would have the dead body of the fox hanging from his paddock fence. A warning to others. He'd have no more foxes round his farm.

The big fox ran on noiselessly. He was past the plough now, his moon-shadow pale against the short grass. The farm was to the south of him, the wind carrying the strong farm smells to his nose. His long tongue curled hungrily round his polished black lips. The Man was a fool.

The farmer straightened up with a grunt. That

should do it. He looked at it thoughtfully. Looked harmless enough. But it meant death for the thief that had been at his chickens. The trap was a simple box, made of wire netting. It was long and narrow. At one end was a sliding door. The door slid up and down. It was held up by string. The string held it so that it hung above one end of the trap, ready to drop and close the trap. The string was important. One end held the sliding door up. The other end led to the back of the box. It went down through the back of the box to the floor. The end of the string was looped over the corner of the bait tray. The bait tray was a tray hinged to the floor. It was at the far end of the box from the door. When the bait tray was lying flat on the floor, it held the string in position to keep the door up and open. When the weight of the bait was taken off the tray, the tray flicked up and let the string go. The bait lay on the tray, and had to be heavy enough to hold the tray down. A freshly killed chicken was good bait for a fox. The fox smelt the bait. It went in through the open end of the box. It took the bait off the tray. That let the string go. The sliding door fell down and closed the box. The fox was trapped.

"And then dead," muttered the farmer grimly. He had placed the trap near the hen-house door. It was by a small gap in the thick hedge that ran round the northern edge of the farm. A freshly killed chicken lay in the bait tray. He could go in now, get his tea, and

watch the football on T.V.. The morning would be soon enough to come out with his gun. The barrel would slip between the wires easily enough. He'd need to wash out the trap before he took it back to Ferguson, though. Fox brains make a nasty mess when they're splashed about.

The big fox padded through the inky darkness towards the trap. The strong smell of chicken filled his nostrils. It filled his mind, too. He looked almost as if he was laughing. His black, rubbery lips gleamed wetly in the moonlight. In his mouth he carried a small, grey stone. It was heavy, and about the size of a man's hand. It felt cold and uncomfortable in his mouth.

"Aye, not long now." In his warm kitchen, the farmer leaned back comfortably in his chair. He picked thoughtfully at a small piece of bacon stuck between his teeth. Few enough teeth anyway, he thought to himself. Not like the brown killer out yonder. Still, his killing days were over.

"Keep the kids in tomorrow morning, love," he called to his wife. "I'd not like them to see a fox being shot. It's a messy business, and they're grand beasts in their way." Angry though he was, he was not a man who would enjoy shooting a trapped animal.

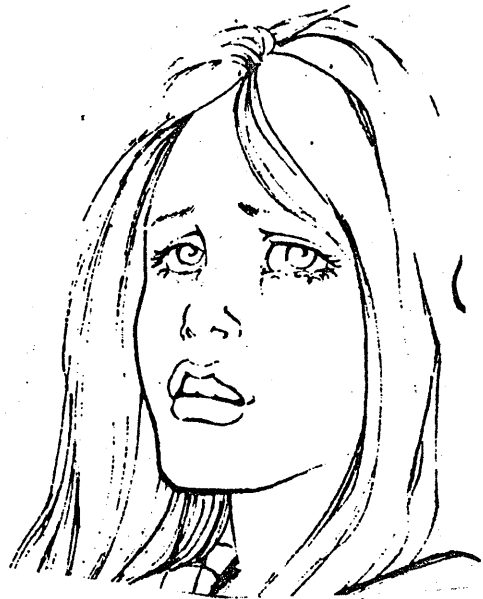
The big, low shadow slipped back through the gap in the hedge. In its mouth was a still-warm chicken. When past the end of the hen house, the big fox broke into an easy gallop. The slack head of the dead chicken swung loosely as he ran. The cubs would be waiting.

The morning sunlight flooded in through the kitchen window. The farmer's wife looked up sharply as the door slammed. Her husband sounded angry. That was unusual, she thought to herself. He was usually a gentle man, not easily angered or quick to show temper. He strode in across the polished, tiled floor, and roughly shoved a grey stone down on the wooden table. It was heavy, and about the size of a man's hand. Then, in spite of his anger, the farmer's face split in a grin.

"Ah, well," he said, "I'd not have enjoyed shooting it in the trap. Tonight I'll just have to wait up and watch for it with my gun. Some lad, this fox, but I'll have him!" He laughed quietly, looking at the stone on the table.

"At least, this time he left me something in return."

Escape at Midnight



Escape at Midnight !

Lord Angus Mcleish looked grim. He would stop this nonsense. His daughter Anne was a lovely girl, but too wild in her ways for a Duke's daughter. This foolishness about young Martin had gone too far, and must be stopped. He liked Martin. But that meant nothing now. Martin was a groom in his stables. He was a fine, honest and strong lad. But that meant nothing, and Lord Angus was deeply angry at what his daughter had just told him.

"We love each other," she'd said simply.

He felt hot anger as he thought of it, his daughter with a groom. His spurs jingled as he strode across the castle courtyard. Anne had made him promise to wait. She had seen his anger and hurt, and begged him to do nothing that same evening. She looked so like her mother, dead these last seven years. And like her mother, she knew him so well, understanding his proud anger.

"Please, father," she had begged, her golden hair lifting slightly in the soft evening breeze. "Do nothing until tomorrow, when you may be calmer." Then she had added quietly, "For mother's sake - she would have understood." He shook his head angrily, as if to escape his thoughts, his hand gripping his sword. Very well, he would do nothing this night. But tomorrow he would. Tomorrow, the groom must pay with his life.

Anne watched him go, tears stinging her eyes as she realised how deep were his anger and hurt. She would not give up Martin. Her father would never understand. For him, it was a crime for someone as lowly as a groom even to look at her. He was proud and ruthless. Tomorrow, she knew, he would order Martin's death, although he hated hurting her in any way. The sword was the only answer he really understood. But he would wait, as he had promised, and that gave them some time. She turned and hurried away. It was early evening, and Martin would be working still in the castle stables. Yes, there he was. His back was towards her, and she watched him a moment, loving the gentle way he worked with horses.

"Martin," she whispered, "I have told him."

He swung round sharply, his strong face suddenly pale in the flickering yellow lamplight.

"Don't fear, lass," he murmured, as she stumbled blindly into his arms. "We'll find a way."

"We must escape tonight, Martin," she sobbed, "for tomorrow he will have you killed." Just then, they heard shouted orders in the courtyard, and the rattle of chains and wheels. The drawbridge was being raised. Each sunset it was raised, locking all within.

Lord Angus heard the sound too. Just in time, he thought, remembering how Anne had slipped away towards

the stables. By God, how like her mother she was, passionate and proud sometimes, then suddenly so soft and foolish. But this foolishness must not be, and Martin must die. Tomorrow morning. That much he had promised.

The night was dark, starry but moonless. Anne and Martin paused. The drawbridge looked so big. Could they manage ? Just two of them alone must move it if they were to escape. The drawbridge was made of heavy planks. A water-filled moat surrounded the castle. The drawbridge lay across it. Two big wheels pulled the chains that raised the drawbridge. The wheels stood inside the gate, one on each side, and the chains went up through holes in the wall above the gate. Turning the wheels pulled in the chains. As the chains were wound in round the two wheels, the drawbridge swung up. Each wheel was fixed to a great wooden post, on a long iron handle that passed through the post and turned the wheel. It was heavy, and raising the drawbridge needed five strong men on each handle. Heavy rocks stood nearby. When the drawbridge was up, a rock was jammed in under each wheel. This 'locked' the wheel and chains, keeping the drawbridge up.

To lower the drawbridge, five men took each handle again. Then the rocks that had jammed each wheel were dragged aside. The great wheels were turned, slowly unwinding the chains again. As the chains unwound, they

slipped out through the holes above the gateway, slowly lowering the heavy drawbridge. The job of the five men on each handle was to stop it running out too fast. The drawbridge was heavy. So the rocks used to jam the wheels were large. They had to be, to jam the wheels firmly. They were wedged into place with sledgehammers. Moving them clear needed crowbars. But they did the job. It was a rough, simple system, but it worked.

"We'll never do it," whispered the girl. They stared silently at the great black shape before them. Anne felt terrible, guilty and miserable about it all, bitterly telling herself that the fault was all her own. As always, she had rushed into things, without thought. If she had stopped to think, she would have realised how her father would react. But she hadn't, and because of her blind stupidity, Martin would die. She turned towards him in the darkness, terrified and trembling. But he seemed unworried, smiling slowly as he studied the great chains and wheels.

"Come on, lass," he chuckled quietly, "we have much work to do."

Lord Angus watched them from his darkened window in the tower. Despite his anger, he felt a deep sorrow. Martin was a fine man. But a duke's daughter must marry her own kind. What had to be done, would be done. He had ordered the drawbridge closed early that evening. Those great rocks could never be moved by two people.

Until morning, the castle was like a prison.

It was the darkest part of the night. Sentries became sleepy and careless. Martin watched the movements of the spearman on the battlements above him.

"Now, Anne, and quickly!" he hissed, swiftly leading his own horse forward. The two horses made no sound. Their hooves were wrapped in soft cloths. The gleaming metalwork on their bridles and saddles was blackened over. Dark shapes on their backs could be made out, great lengths of strong rope, coiled down. In front of their saddles, they wore the heavy harnesses of wagon horses. The strange group moved silently through the shadowy, dark courtyard.

The Captain of the Guard watched Lord Angus fearfully. The splintered drawbridge lay before them, the broken chains gleaming dully in the dancing, yellow torchlight.

"Only five minutes ago, Sire," he gasped nervously. "A party of fast horsemen may catch them yet, with good luck."

"No, friend, let them go....."

Anne laughed with joy. With every thundering step, their galloping horses brought freedom closer. Freedom to live with the man she loved. Martin's plan had worked perfectly, as he'd expected. Only someone who

knew and loved horses as he did could have succeeded. They had led their nervous, tense horses across the starlit courtyard. Using the wagon harnesses and ropes, each horse had been harnessed to a great rock that jammed the wheels. Then, working with desperate speed, they had mounted their prancing, harnessed horses. At Martin's signal, they had urged their straining horses forward. As the great rocks that jammed the wheels shifted, down crashed the drawbridge. And over the splintered wreckage they had galloped to freedom.

Hearing Anne's laughter above the thundering hooves, Martin turned in his saddle and smiled. And somehow, Anne knew they were safe.

RED TEST

For passages:

- (i) 'The Carry Out'
- (ii) 'The Tukens: a Trapping Tribe in the Far North'

In the passage you have just read, a trap for foxes was described. This test finds out how much you remember about the trap.

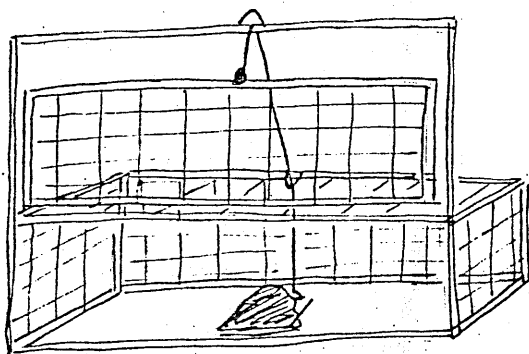
There are three parts to the test. After you finish each part, return it to the teacher, and get the next part.

Write your answers on the answer sheet you have been given.

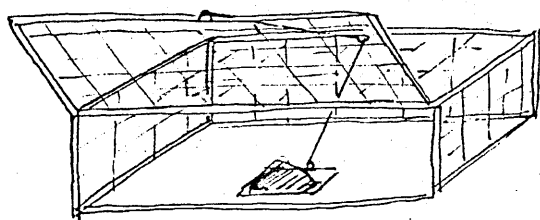
PART 1 Red Test

The following pages show ten different foxtraps. Only one of the foxtraps exactly fits the foxtrap in the passage.

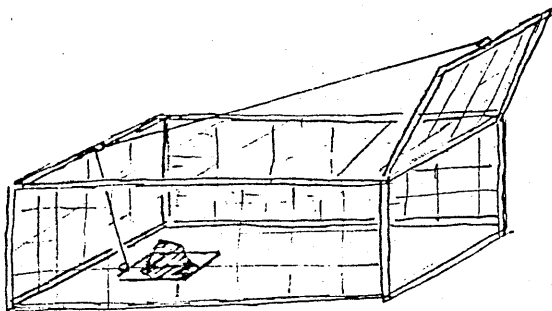
Which one is it?



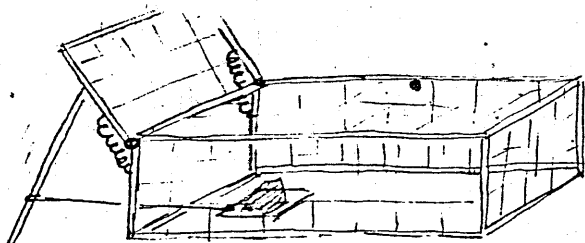
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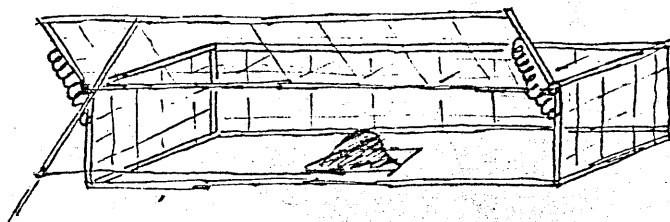
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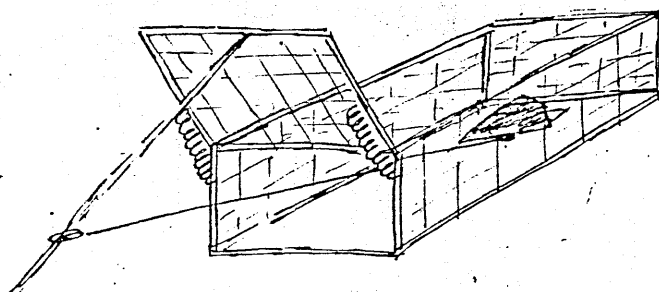
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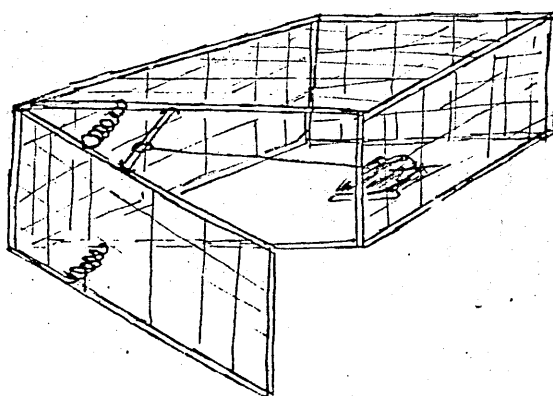
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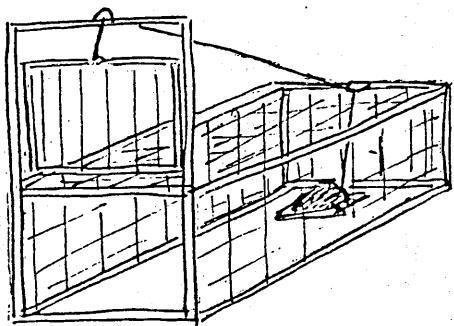
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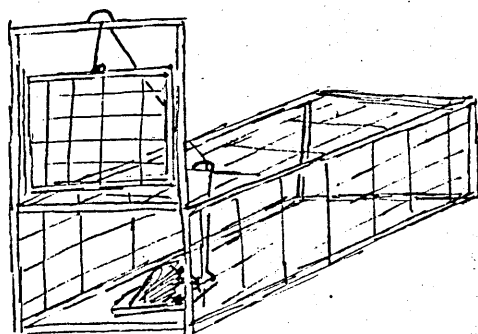
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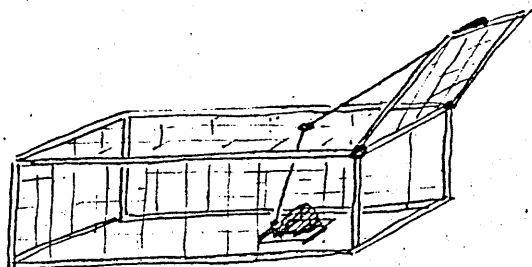
7



8



9



10

PART 2 Red Test

Fill in each gap with one word:

1. The trap is shaped like a _____.
2. The trap is made of _____.
3. The _____ hangs above the open end of the trap.
4. The door is held in position by a length of _____.
5. At the other end, the length of _____ is looped round the bait tray.
6. The bait tray is a tray fixed to floor by _____.
7. The _____ must be heavy enough to hold down the bait tray.
8. When the fox takes the bait, the _____ flicks upwards.
9. The _____ is released, and lets the door close.
10. To make sure the fox goes right into the trap, the _____ is well away from the door.

PART 3: Red Test

For each sentence, say if (a), (b), (c) or (d) is right.

(Only one can be right in each sentence)

1. The trap is
 - (a) a hole in the ground, covered in twigs
 - (b) a round basket with no lid
 - (c) a box shape, with a door at one end
 - (d) a metal tin, with a hole cut in one side
2. The door of the trap
 - (a) hangs above one end of the trap
 - (b) is a circle cut into the roof of the trap
 - (c) is hinged to the side of the trap
 - (d) is covered in twigs and leaves
3. The door of the trap
 - (a) is held in place by a strong spring
 - (b) is held open by a balanced twig
 - (c) is held up by a piece of string
 - (d) looks like a pile of twigs and leaves
4. The door closes when
 - (a) the fox knocks aside the balanced twig
 - (b) the fox falls through the false cover of twigs
 - (c) the fox touches the spring
 - (d) the string holding it up is let go
5. The bait tray is
 - (a) at the door of the trap
 - (b) in the middle of the trap
 - (c) at the far end of the trap from the door
 - (d) invisible to the fox as it comes in
6. The bait tray is
 - (a) at the bottom of a hole in the ground
 - (b) covered by twigs and leaves
 - (c) held down by the weight of the bait
 - (d) just outside the trap
7. The fox
 - (a) cannot see the bait from the door
 - (b) must go right into the trap to take the bait
 - (c) would be safe if it ate the bait inside the trap
 - (d) can reach the bait without going into the trap

8. When the fox takes the bait
 - (a) the bait tray slides towards the door
 - (b) the bait tray flicks upwards
 - (c) the bait tray flicks sharply downwards
 - (d) The bait tray slides towards the back of the trap

9. The movement of the bait tray
 - (a) lets go the twig that holds open the door
 - (b) cannot be seen by the fox
 - (c) lets go a spring which closes the door
 - (d) lets go a string holding up the door

10. The door
 - (a) shuts before the bait is taken
 - (b) closes as the fox passes into the trap
 - (c) falls down and closes the trap
 - (d) will close even if the fox does not take the bait

BLUE TEST

For passages:

- (i) 'Escape at Midnight'
- (ii) 'Frontier! Life in a Border Castle 400 Years Ago'

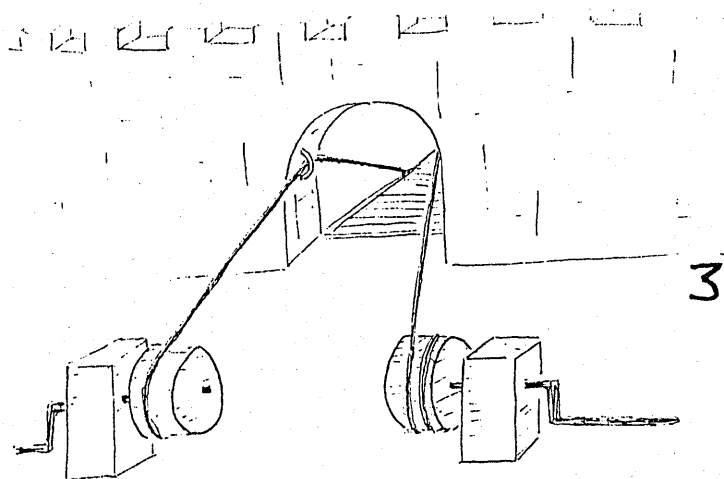
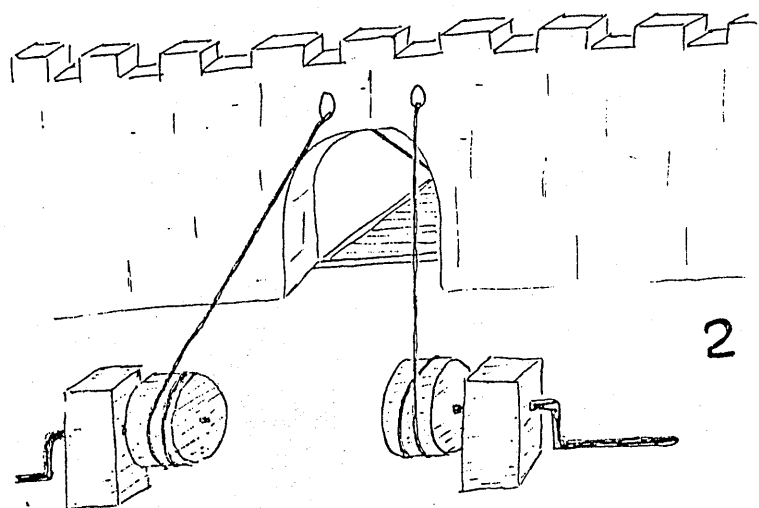
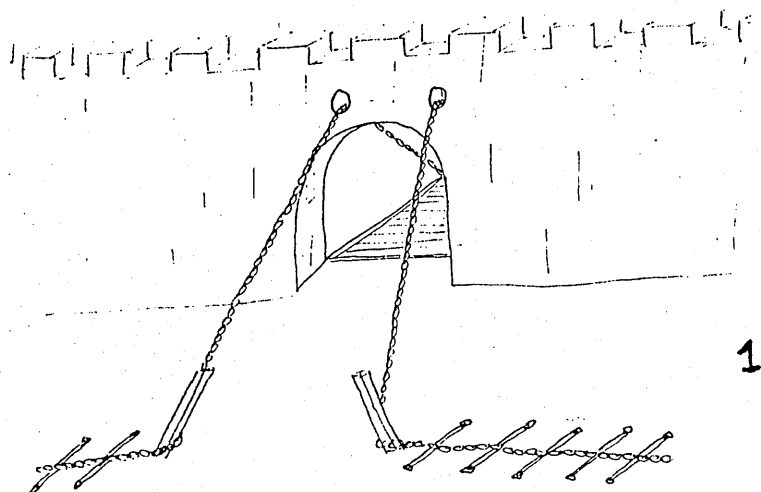
In the passage you have just read, a castle drawbridge was described. This test finds out how much you remember about the drawbridge.

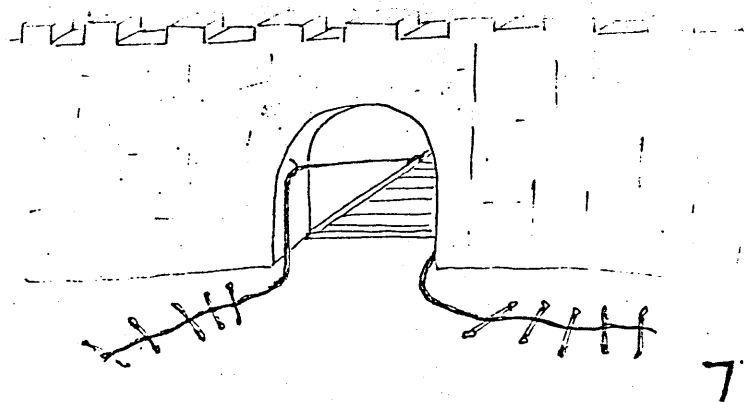
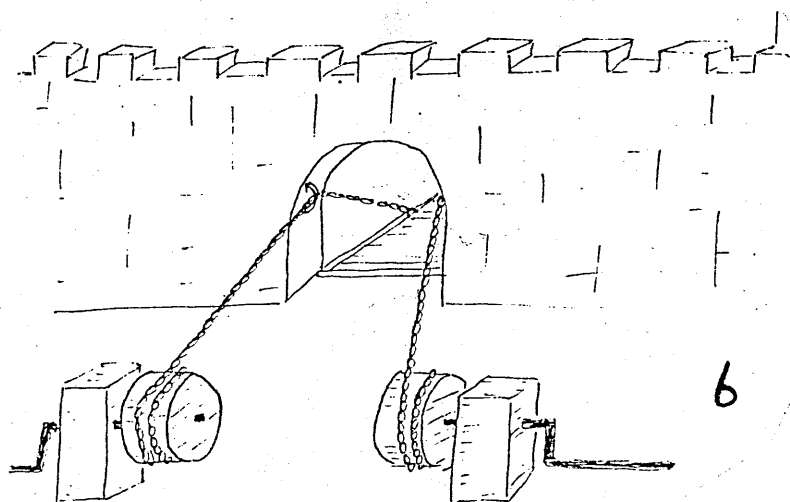
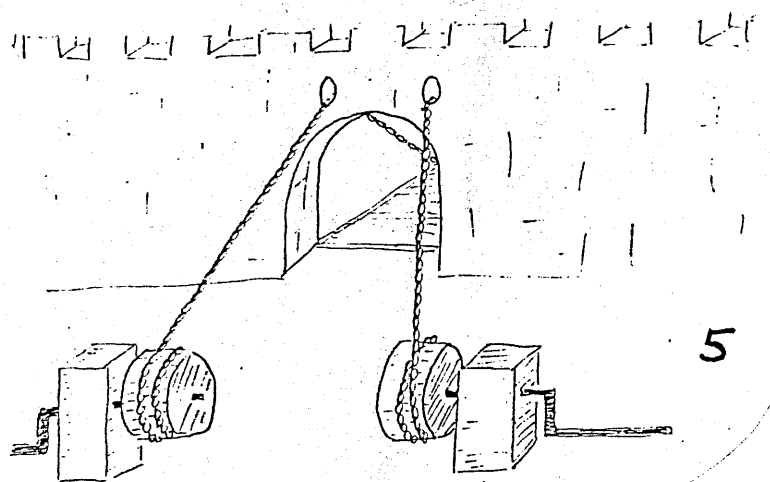
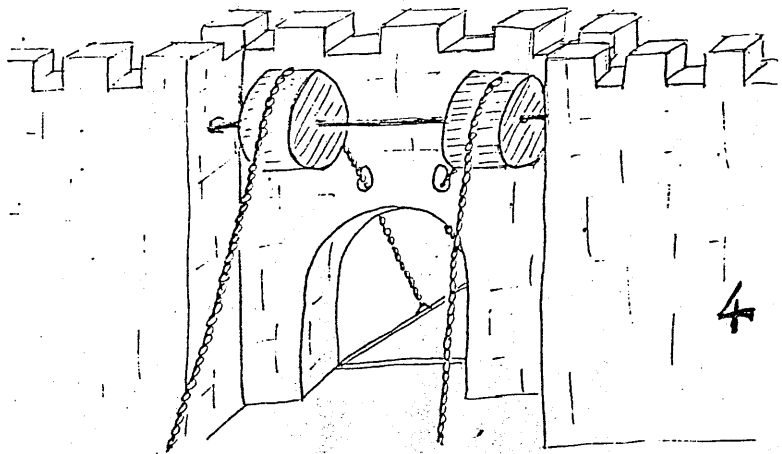
There are three parts to the test. After you finish each part, return it to the teacher, and get the next part.

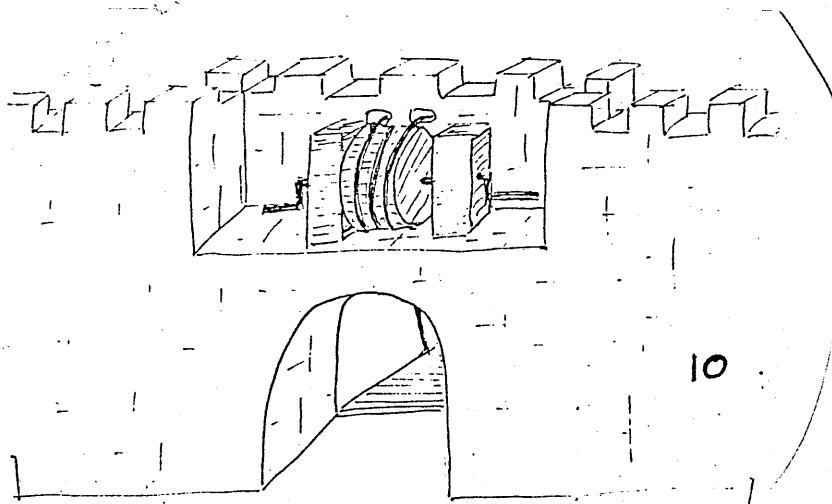
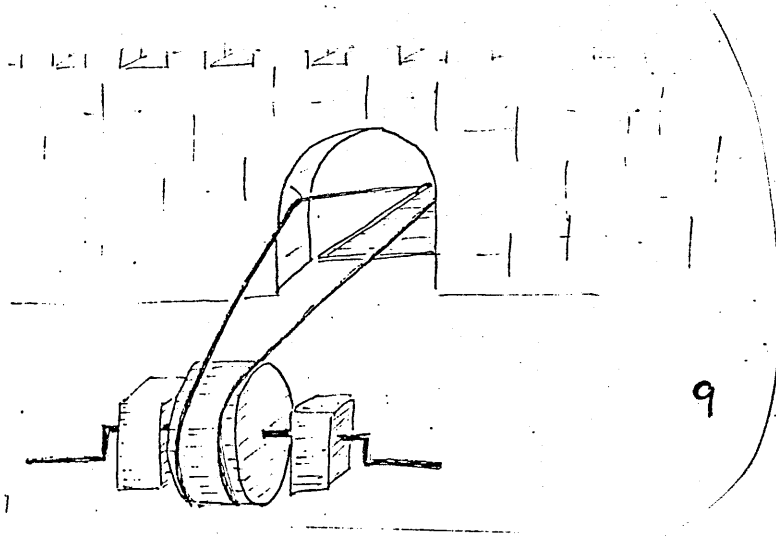
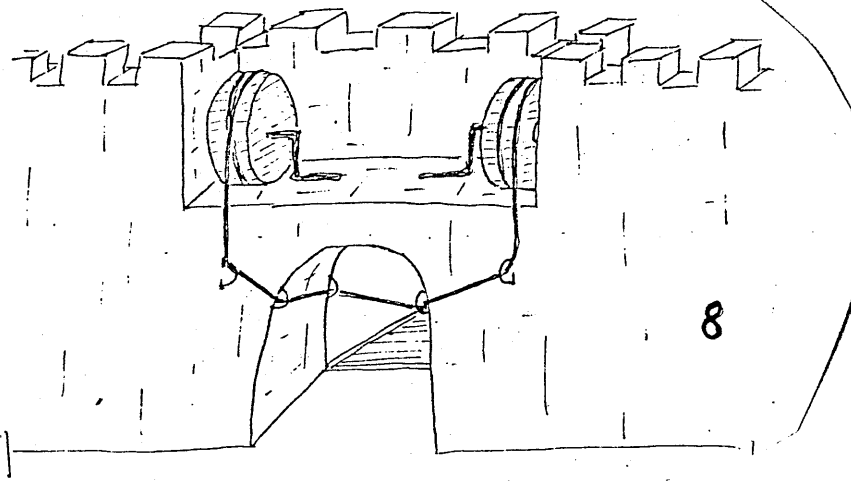
Write your answers on the answer sheet you have been given.

PART 1 Blue Test

The following pages show ten different drawbridges. Only one of the drawbridges exactly fits the drawbridge in the passage.
Which one is it ?







PART 2 Blue Test

Fill in each gap with one word:

1. The drawbridge is made of _____.
2. A deep _____ surrounds the castle.
3. Inside the castle gate are wheels for working the drawbridge. The wheels are mounted on wooden _____.
4. The wheels are connected to the drawbridge by _____.
5. Above the gateway are two _____.
6. The wheels are turned by iron _____.
7. Each wheel needs _____ men to work it.
8. When the drawbridge is up, it is 'locked' into place by _____.
9. The sledgehammer is needed after the drawbridge has been _____.
10. The crowbar is needed before the drawbridge is _____.

PART 3 Blue Test

For each sentence, say if (a), (b), (c) or (d) is right.

(Only one can be right in each sentence)

1. The drawbridge is made of
 - (a) light, strong sheets of wood
 - (b) iron sheets
 - (c) long lengths of iron
 - (d) heavy lengths of wood
2. When the drawbridge is fully raised
 - (a) it is possible to get into the castle
 - (b) it blocks the gate and leaves the moat with no bridge
 - (c) it is possible to get out of the castle
 - (d) the moat has a strong wooden bridge across it
3. The drawbridge chains are pulled in by
 - (a) two great wheels
 - (b) one great wheel
 - (c) teams of men pulling on chains like a tug of war team
 - (d) donkeys harnessed directly to the chains
4. The drawbridge chains
 - (a) go directly from the wheels to the drawbridge
 - (b) pass through special holes above the gateway
 - (c) pass through special holes beside the gateway
 - (d) are pulled in by wheels set high on the castle walls
5. The wheels are
 - (a) light and quite easy to turn
 - (b) turned by donkeys pulling them round
 - (c) fixed to strong wooden posts by long iron handles
 - (d) fixed to the castle walls by long iron handles
6. There are rocks close by
 - (a) for the men to stand on when they are working the drawbridge
 - (b) to lean sledgehammers and crowbars against
 - (c) to stack against the drawbridge to keep it up
 - (d) to shove in hard against the wheels when the drawbridge is up
7. Sledgehammers are used
 - (a) to start the drawbridge moving
 - (b) to drive the rocks hard into position
 - (c) to lever the rocks away from the wheels
 - (d) to hammer in the upright posts properly

8. Five men are needed on each wheel
- (a) only when raising the drawbridge
 - (b) only when lowering the drawbridge
 - (c) whenever it is being raised or lowered
 - (d) to handle the donkeys turning the wheels
9. Crowbars are used
- (a) to lever the rocks away from the drawbridge
 - (b) to turn the wheels
 - (c) to wedge the rocks into position
 - (d) to lever the rocks away from the wheels
10. When the drawbridge is being lowered, the job of the men at the wheels is to
- (a) make it go down quickly
 - (b) look after the donkeys
 - (c) control its speed as it is lowered
 - (d) calm the donkeys if the noise of rattling chains scares them.

Red Test Answer Sheet:

NAME: _____ SCHOOL: _____

AGE: _____ SEX (BOY or GIRL): _____

Tick which passage you read: THE TUKENS _____
THE CARRY OUT _____

PART 1:

Drawing number _____ is the right drawing.

PART 2:

- | | |
|----------|-----------|
| 1. _____ | 6. _____ |
| 2. _____ | 7. _____ |
| 3. _____ | 8. _____ |
| 4. _____ | 9. _____ |
| 5. _____ | 10. _____ |

PART 3: Tick to show the right answer:

- | | | | | |
|---|---|---|---|--|
| 1. (a) <input type="checkbox"/>
(b) <input type="checkbox"/>
(c) <input type="checkbox"/>
(d) <input type="checkbox"/> | 2. (a) <input type="checkbox"/>
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(c) <input type="checkbox"/>
(d) <input type="checkbox"/> | 3. (a) <input type="checkbox"/>
(b) <input type="checkbox"/>
(c) <input type="checkbox"/>
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(b) <input type="checkbox"/>
(c) <input type="checkbox"/>
(d) <input type="checkbox"/> | 8. (a) <input type="checkbox"/>
(b) <input type="checkbox"/>
(c) <input type="checkbox"/>
(d) <input type="checkbox"/> | 9. (a) <input type="checkbox"/>
(b) <input type="checkbox"/>
(c) <input type="checkbox"/>
(d) <input type="checkbox"/> | 10. (a) <input type="checkbox"/>
(b) <input type="checkbox"/>
(c) <input type="checkbox"/>
(d) <input type="checkbox"/> |

Blue Test Answer Sheet:

NAME: _____

SCHOOL: _____

AGE: _____

SEX (BOY OR GIRL): _____

Tick which passage you read: ESCAPE AT MIDNIGHT _____

FRONTIER _____

PART 1:

Drawing number _____ is the right drawing.

PART 2:

1. _____

6. _____

2. _____

7. _____

3. _____

8. _____

4. _____

9. _____

5. _____

10. _____

PART 3: Tick to show the right answers:

1. (a) ☐
(b) ☐
(c) ☐
(d) ☐

2. (a) ☐
(b) ☐
(c) ☐
(d) ☐

3. (a) ☐
(b) ☐
(c) ☐
(d) ☐

4. (a) ☐
(b) ☐
(c) ☐
(d) ☐

5. (a) ☐
(b) ☐
(c) ☐
(d) ☐

6. (a) ☐
(b) ☐
(c) ☐
(d) ☐

7. (a) ☐
(b) ☐
(c) ☐
(d) ☐

8. (a) ☐
(b) ☐
(c) ☐
(d) ☐

9. (a) ☐
(b) ☐
(c) ☐
(d) ☐

10. (a) ☐
(b) ☐
(c) ☐
(d) ☐

Appendix 1B: Marking Instructions for Study 3.1 Tests

Part 1: Identifying the correct diagram.

Each mechanism was deemed to have four significant distinguishing attributes, each worth 5 marks. Maximum score 20.

Significant attributes of the trap:

- sliding vertical door
- bait tray well away from door
- string operated door
- long thin box shape

Significant attributes of drawbridge:

- wall holes above gate
- two wheels
- mechanism inside gate
- chains.

Diagram	Red Test marks	Blue Test marks
1	15	10
2	5	15
3	15	10
4	5	15
5	5	20
6	10	15
7	5	5
8	20	5
9	15	5
10	10	5

Part 2: Cloze statements.

1 mark per acceptable restoration. Maximum score 10.

Part 3:

1 mark per answer. Maximum score 10.

Question	1	2	3	4	5	6	7	8	9	10
----------	---	---	---	---	---	---	---	---	---	----

Red test	c	a	c	d	c	c	b	b	d	c
----------	---	---	---	---	---	---	---	---	---	---

Blue test	d	b	a	b	c	d	b	c	d	c
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APPENDIX TWO.

**Experimental material from
Study Two.**

Appendix 2A

Framework of Main Ideas

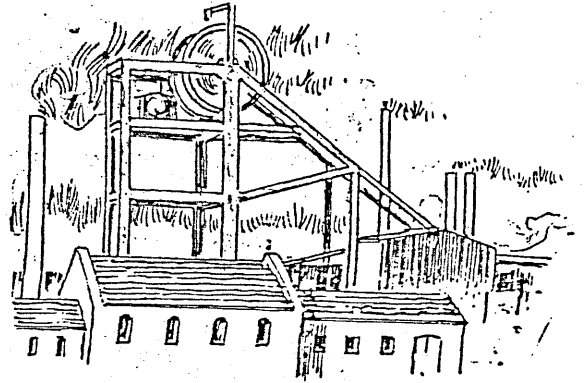
The two frameworks are shown below. Each was developed into a High Difficulty and Low Difficulty version, as discussed in 3.2.3, and as shown below in Part 2.

(i) Framework for Red passages: 'THE BIRTH OF A CITY ?'

Introduction	- a 'then/now' contrast, and the question 'Why?'
Content para 1.	
introduction to main idea	- necessary raw materials on hand
main idea/ macroproposition	- papermill opens
development of main idea	- mill flourishes
Content para 2.	
introduction to main idea	- wages meant money in area
main idea/ macroproposition	- small shops and businesses open
development of main idea	- prosperity spreads outward from mill
Content para 3.	
introduction to main idea	- employment potential increases
main idea/ macroproposition	- more people move into area
development of main idea	- expansion increases
Conclusion	- speculation about future

(ii) Framework for Blue passages 'THE DEATH OF A VILLAGE?'

Introduction	- a 'Then/now' contrast, and the question 'Why?'
Content para 1.	
introduction to main idea	- increasing cost of mining coal
main idea/ macroproposition	- coal mine closed
development of main idea	- resulting unemployment and poverty
Content para 2.	
introduction to main idea	- migration and decay starts
main idea/ macroproposition	- village school closes
development of main idea	- decay and migration accelerate
Content para 3.	
introduction to main idea	- increasing poverty and ugliness
main idea/ macroproposition	- more people move away
development of main idea	- village rotting faster and faster
Conclusion	- speculation about future



THE DEATH OF A VILLAGE ?

Passage Blue 2

Eighty years ago, Pitroddie's streets were full of bustling life. Now it seems a ghost town, empty and hopeless. Why has it changed ?

Change came because coal became expensive to dig. The coal mines flooded easily, and became dangerous to work. Increasingly expensive machinery was needed. Competition from cheaper fuels was fierce. So, twenty years ago, Pitroddie's main coal mine was closed down. Four hundred men were laid off. The two smaller pits continued for seven years, but then closed too. It became a village of hopeless unemployment.

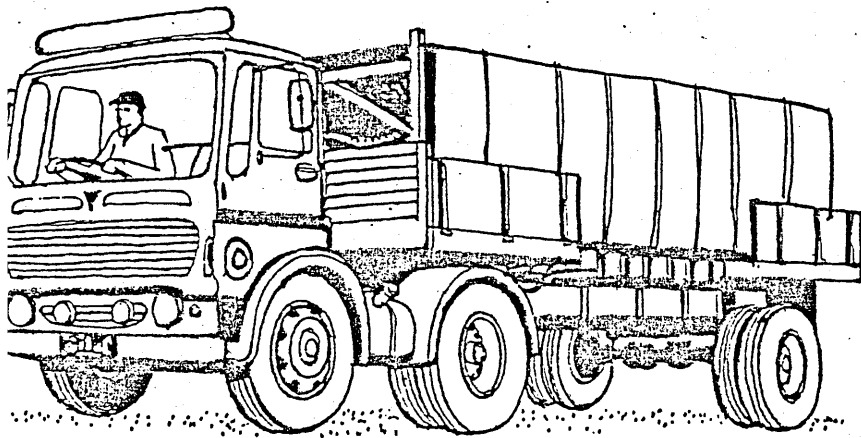
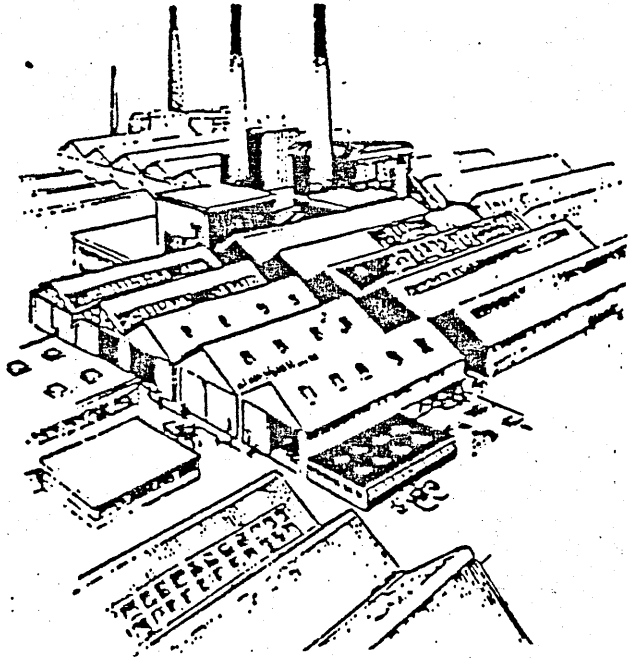
Young men moved away to search for work. Fewer

children could be seen playing in the streets. Many houses were standing empty and boarded up. Public services of all kinds decayed and were withdrawn. Ten years ago, the village's own school was closed down for lack of pupils. This caused a further loss of local jobs, for teachers, cleaners, cooks and janitors. The children bussed away to school lost some sense of belonging to the village. The nearby chip shop and sweet shop closed soon after. Many families with young children moved away, to be nearer to schools.

There was less and less spending money in the village. The baker and video shop closed soon after the sweet shop and chip shop. Soon, the village looked ugly, dirty and empty. Bored kids with no work smashed windows and vandalised empty buildings. Increasingly, it became a depressing place to live, and more people moved out. Soon, whole streets were empty. The Council could offer houses to anyone, but no-one wanted to live in Pitroddie. With empty buildings being demolished, great gaps appeared in the village. Within twenty years, the population had halved itself.

It is an old and sad story. A community depends on one industry, and that industry closes. Soon, the community starts to die. Today, Pitroddie is half the size of twenty years ago. What will be left, twenty years on from now ?

THE BIRTH OF A CITY ?



Passage Red 2

Fifty years ago, Glenmain was just river and thick woods. Today, it is a busy little town, growing quickly. What caused this change ?

The woods and river caused the change. Paper making needs wood pulp, and needs plenty of water. The woods provided the pulp. The river provided the necessary water. So, five years ago, a paper mill was started at Glenmain. Right from the start, it flourished. The mill did well, and expanded fast. Business grew and grew, and paper making developed quickly in the area.

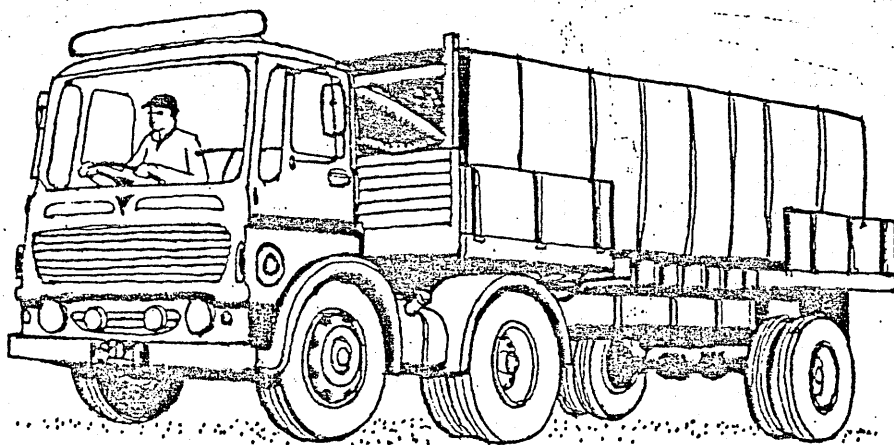
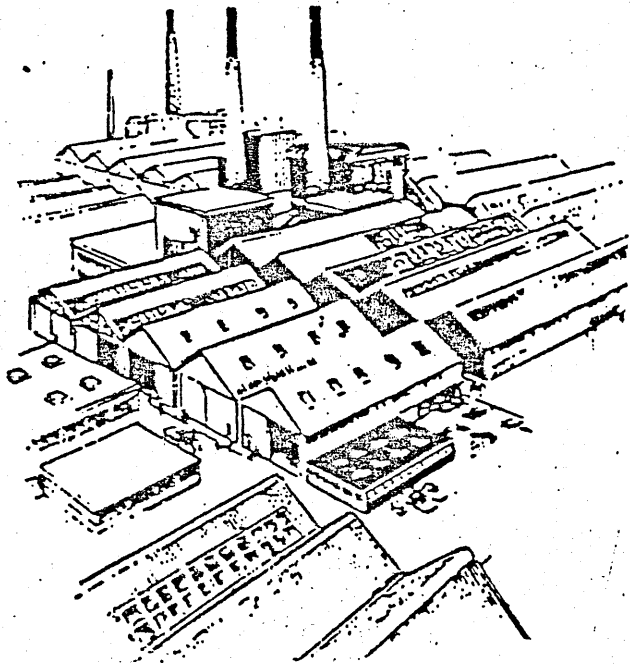
Now the workers' families had money to spend. Their

weekly wage packets were packed full of notes. Families now had plenty of money to spend. Mums were out shopping with purses full of money. Very soon, new shops and small businesses opened up to meet these new demands. The mill was the direct cause of this growth of shops, supermarkets and businesses. It was the mill's success that allowed these other businesses to start. Their success stemmed directly from the success of the mill. It was the centre from which new jobs and wages spread outwards.

This growth in local businesses meant growth in local jobs. There were now jobs of many kinds to be had in the town. These new businesses needed people to work in them. Glenmain became a place where people could expect to find work. More and more people came from far away, to live and work there. The town grew rapidly now. With families moving in steadily, year by year the town spread and grew stronger. More and more people moved in to fill the new jobs. Each year, there were more people living there.

The future looks bright and hopeful still. Paper making grew from the woods and river of Glenmain. Quickly a town grew round it. Today, Glenmain is big, and still growing rapidly and strongly. How big will it be five years from now ?

THE BIRTH OF A CITY?



Passage Red 1

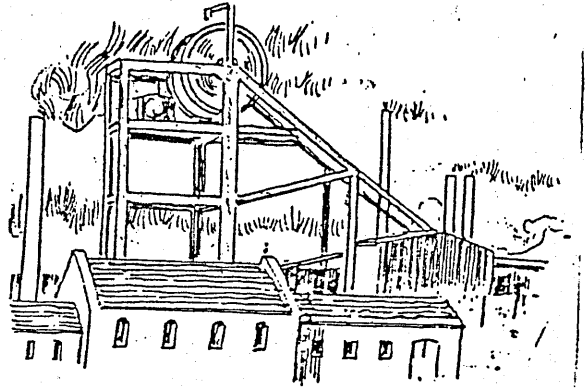
Fifty years ago, Glenmain was just river and thick woods. Today, it is a busy little town, growing quickly. What caused this change ?

The woods and river caused the change. Papermaking needs wood and water. The river water supply was reliable. Birches, firs, ashes, sycamores and pines provided the necessary woodpulp. So, five years ago, a paper mill was started at Glenmain. It flourished, and quickly tripled its output. It employed twenty men, then fifty. Within three years it employed two hundred people, still continuing to grow.

Mill working was skilled and well paid work. There was now more spending money in the community. Families had money for food, clothes, entertainments and leisure. Youngsters had money for cars, pubs and discos. Very soon, new shops and small businesses opened up to meet these new demands. The mill's success led to the first big supermarket and car park in Glenmain. A bowling alley, a pub and a restaurant opened nearby, close to the river. A shopping centre and a hotel were started. Then a garage and car saleroom opened, all due to the mill.

This growth in local business meant growth in local jobs. There was office and shop work, catering, cleaning, driving, and the building trade. There were vacancies for apprentices, mechanics, secretaries and managers. Glenmain offered work to skilled and unskilled workers in many trades. More and more people came from far away, to live and work there. The town grew rapidly now. Expensive bungalows with big gardens were built in the wooded fields by the riverside. Three housing estates, and two schemes of council flats were built. Six thousand new people came over four years.

The future looks bright and hopeful still. Paper making grew from the woods and river of Glenmain. Quickly, a town grew round it. Today, Glenmain is big, and still growing rapidly and strongly. How big will it be five years from now ?



THE DEATH OF A VILLAGE ?

Passage Blue 1

Eighty years ago, Pitroddie's streets were full of bustling life. Now it seems a ghost town, empty and hopeless. Why has it changed ?

Change came because coal became expensive to dig. All of the costs involved in mining coal rose steeply. The mines were not paying. Coal mining was losing money badly. So, twenty years ago, Pitroddie's main coal mine was closed down. Many people became poor and unemployed. Only a few people were still working. Many people felt angry and hopeless, with no work and little money.

People started to move away, and the rot started. The

village started to become empty and abandoned. There were fewer people each year in Pitroddie. Fewer and fewer families wanted to stay on now. Ten years ago, the village's own school was closed down for lack of pupils. The closing of the village school seemed to speed up the decay. The jobs left in the village got fewer and fewer as shops closed down. There was less and less work to be had there. More and more families moved away to places with work and schools.

There was little spending money in the village, and a lot of poverty. Very few people had money to spare for anything. The whole village started to look dirty, poor and hopeless. It looked uncared for, as if no-one bothered about it now. Increasingly, it became a depressing place to live, and more people moved out. Soon, whole streets were empty. Pitroddie was a village that had started to rot steadily away. Its empty streets were untidy, dirty and poor. It was a village that had nothing to offer, and no-one wanted to stay.

It is an old and sad story. A community depends on one industry, and that industry closes. Soon, the community starts to die. Today, Pitroddie is half the size of twenty years ago. What will be left, twenty years from now ?

Test for 'THE BIRTH OF A CITY?'

(Red Test)

Write your answers on these sheets.

NAME: _____ GROUP 1 / GROUP 2: _____

AGE: _____ BOY / GIRL: _____

Here is a list of statements about the passage. Some are True (T), some are False (F), and for some there is Not Enough Evidence (NEE) to decide whether they are true or false. Tick to show which kind each statement is.

	T	F	NEE
- There has been a village on the wooded riverbank at Glenmain for hundreds of years			
- In the past, there was nothing in Glenmain except woods and a river			
- The wood and water needed for papermaking were both available in Glenmain			
- The woods at Glenmain are thickest where the river is rather wide and shallow			
- The woods at Glenmain were used for the papermaking, and the water was piped from nearby lakes			
- The timber from the woods had been used for boatbuilding			
- The Glenmain woods had been planted 400 years before the mill opened			
- Because the wood was so suitable for timber, a sawmill opened instead of a paper mill			
- A paper mill opened in Glenmain, making use of the wood and water there			
- The paper mill did well from the beginning, and quickly grew			
- The paper mill did not do well, and a sawmill opened in its place after it closed			
- The success of the mill meant that there was money to be spent in the area			
- Many of the people who came to work in Glenmain mill lived fairly close by			
- The new mill made no difference to how much money was spent in the area			
- A lot of furniture shops opened, because so many people were moving into new houses			

	T	F	NEE
- The area became richer, but very few new shops and businesses opened in Glenmain.			
- New shops started to open when the area became richer			
- Many of the new shops that opened were branches of big shops in the nearest large town			
- It was the mill's success that allowed the new shops and businesses to open			
- The mill was successful, but it was not the direct cause of the new shops and businesses			
- One of the new businesses was a tourist hotel, but it did not stay open long			
- The growth of Glenmain made no difference to the number of jobs in the area			
- While the mill employed mostly men, the new shops and businesses in the town employed mostly women			
- There were more and more jobs for people in Glenmain			
- Many people started to move into Glenmain, attracted by the work there			
- Many of the people who moved to Glenmain came from Glasgow and the west of Scotland			
- Most of the new people moving in each year came in the early summer			
- There was a lot of work for people in Glenmain, but only a few people moved there			
- With the large number of people moving into the area, the town started to grow really fast			
- Because so few people moved there, the town soon stopped growing			

Test for 'THE DEATH OF A VILLAGE?'

(Blue Test)

Write your answers on these sheets.

NAME: _____ GROUP 1 / GROUP 2: _____

AGE: _____ BOY / GIRL: _____

Here is a list of statements about the passage. Some are True (T), some are False (F), and for some there is Not Enough Evidence (NEE) to decide whether they are true or false. Tick to show which kind each statement is.

	T	F	NEE
- Pitroddie has always been a quiet and empty village			
- Before coal was mined there, Pitroddie was quite important as a market town for farmers			
- Pitroddie used to be a very busy village			
- The costs of mining the coal increased			
- Skilled, experienced miners were paid very little more than the young, inexperienced men			
- Pitroddie's main pit stayed open, despite the losses it made			
- Coal became cheaper to mine			
- Pitroddie's main pit was shut, because it was losing money			
- People started to leave the village, because there was no work there			
- The closing of the pits meant unemployment and poverty in the village			
- There was plenty of other work in the village			
- There was still one good seam of coal being worked when the mine closed, but it did not make enough money to cover the losses in the other seams			
- Many of the older miners were glad of the chance to stop working down the pit			
- Although there was no work, and the village was dying, very few people left Pitroddie			
- The first people to leave the village were those who had lived there only a short time			

	T	F	NEE
- Because the village became emptier, with fewer people, the village school closed			
- The school was right in the middle of the village, near the main pit			
- The village school closed, although there were still just as many children in the village			
- Things seemed to get worse after the school closed			
- The school did not close, and this helped stop the flow of families leaving Pitroddie			
- The first families to leave lived in the streets nearest the closed mine			
- As the village emptied, it became ugly and poor looking			
- Because it had been an overcrowded village, it looked cleaner and more attractive when fewer people lived there			
- By the time the village school closed, the village had stopped running down			
- In the streets nearest the village school there were still many houses well looked after and cared for			
- As the village became more run down, more and more people moved out			
- Although there were few people left in the village, there was still a doctor there			
- Very few old people left the village			
- There was nothing to attract people to stay in Pitroddie			
- Although there was no work, people stayed on in Pitroddie			

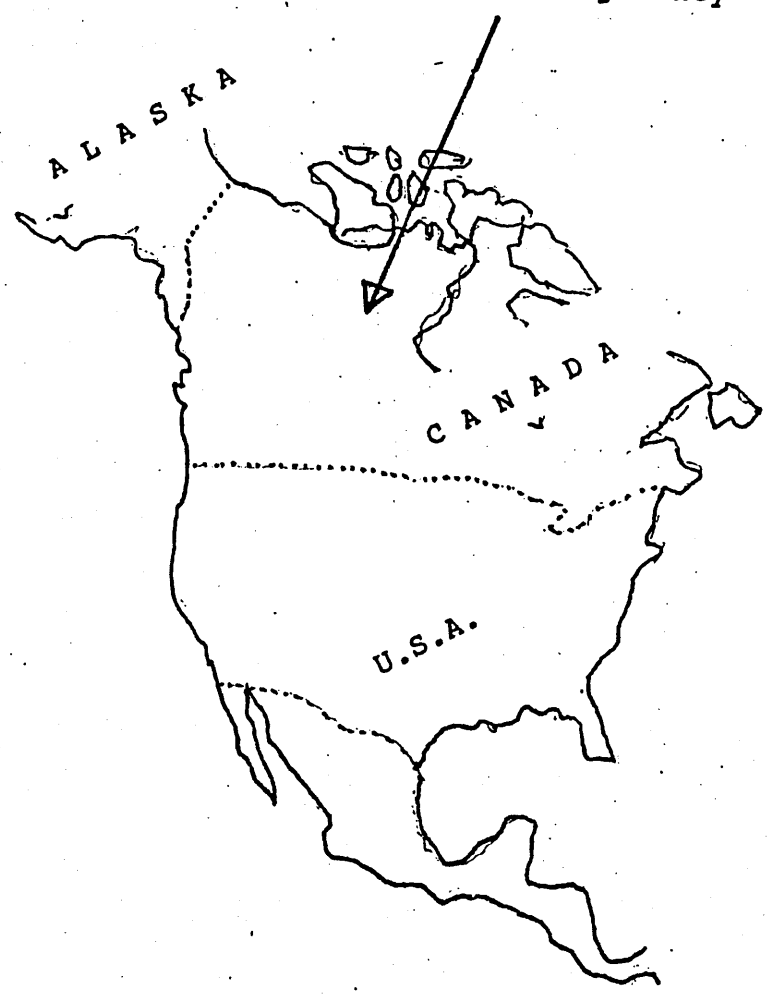
APPENDIX THREE.

**Experimental material from
Study Three.**

ANIMALS ON THE MOVE



Northwest Ontario,
where the animals
made their journey



This is an account of a difficult and dangerous journey across Canada by three animals looking for their owners. Having been left behind when the family went on holiday, they were journeying to find them. The three animals were a Siamese cat, a labrador, and a bull terrier.

Because they started their journey as leaves began to fall, the snows of winter would come soon. It was an area of endless lakes, rushing rivers, and deeply wooded wilderness,

so travelling would not be easy. At such a time of year, in
such countryside, the three family pets
would have little chance of survival.

They were used to being cared for
and fed regularly by friendly
people. But only trappers,
Indians, and hunters used
the vast forests, with a
scattered farm here and
there. The cold, forested
hills and thinly-soiled
valleys made a bleak and
unfriendly landscape,
which would support
very few farms and
families.

Because the
bull terrier was old,
he became exhausted and
weak with hunger before
the young labrador, and
on the third day he collapsed.
He was helpless, starving, and
quite unable to defend himself.

But the cat was fearless, looking
after both himself and his friend the
terrier. A bear cub found the battered
old dog, and it made the mistake of teasing him. The cat,
a scratching, spitting ball of rage, hissed with fury and
attacked, making the cub and mother bear flee in terror.



Food was an endless problem. Although the cat gave some of his kills to his friend the old terrier, the labrador was starving. Because of this he took desperate risks to find food. The cat fed well and often. But for the dogs, finding food was the greatest difficulty, because terriers and labradors are not hunters by nature. Driven by hunger, the labrador attacked a porcupine. But these animals defend themselves with long barbed spikes, and one embedded deeply into the dog's cheek, just below the eye. The wound swelled, making hunting even more difficult, because the dog could not see clearly and was in terrible pain.

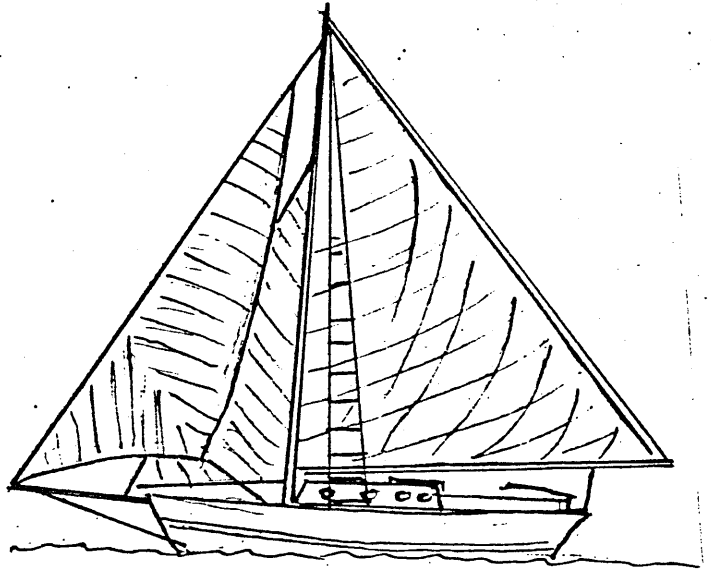
But somehow they survived, because they helped each other. By now the family had given the animals up as dead. But they were amazed and delighted when they suddenly heard again the familiar shriek of an excited Siamese. The cat hurled himself forward, quickly followed by the labrador and lastly, the terrier, grinning from ear to ear. At last the animals had arrived.



He did not know how to sail, so he had to learn as he went along. Also he could not afford to waste any time, because the hurricane season would start if his journey took

too long. These dangers and difficulties made the long journey tough and dangerous. He nearly lost his life several times while learning to sail, so he delayed for a precious week in the Perla Islands off Panama, to get some more practice before the ocean crossing.

Because of this delay, the danger of still being at sea in the hurricane season was increased, so he spent as little time there as possible.

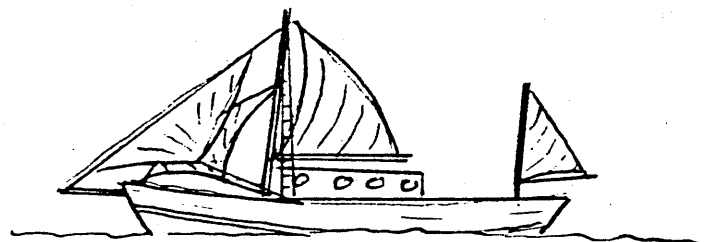


Pagan before

Things went well at first, because he picked up the steady easterly Trade Winds he needed.

But then his luck ran out when his twenty-nine foot boat was savagely battered by a full hurricane. In the hurricane he lost his mast and rigging, and most of his food and water. Because of the storm he had supplies enough for only a week or so, but his battered boat was still weeks away from the nearest land. Although he rationed himself very

the hurricane



Pagan as she looked

after repairs

carefully, still his food ran out completely hundreds of miles from land.

Having managed some rough repairs to his mast and sails, he limped on towards the Fiji Islands in his broken boat. He had no food for weeks, even cutting up and chewing his belt and shoes, and very little water, making him very weak. Then, when he was almost dead from his ordeal, his boat, the Pagan, smashed into a coral reef off one of the Fiji Islands. Unconscious, he drifted ashore, where he awoke on the beach the following morning. But his problems were not over, because he could find nothing to eat in the dense island jungle.

John Caldwell was a lucky man, because two days later some native children chose that bit of beach to play on. When they saw his body, they ran for help. He was cared for and fed, slowly gathering strength, so that he was able to continue his journey, and meet again the new wife he had not seen for so long.

ANIMALS ON THE MOVE

Passage Red 1

Northwest Ontario,
where the animals
made their journey

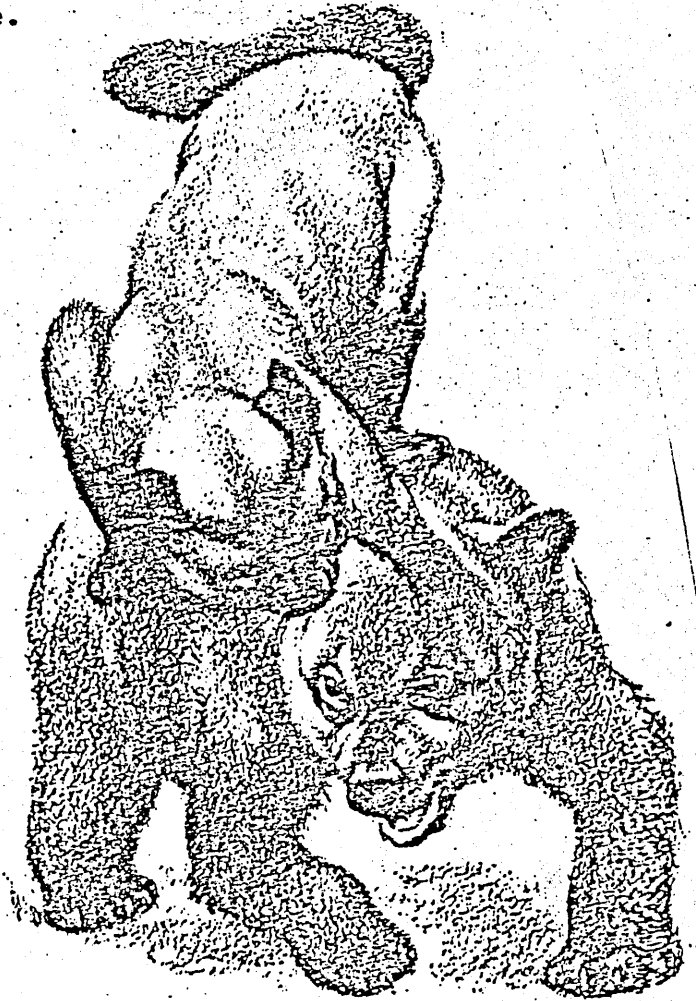


This is an account of a difficult and dangerous journey across Canada by three animals looking for their owners. They were left behind when the family went on holiday, and they were journeying to find them. The three animals were a Siamese cat, a labrador, and a bull terrier.

They started their journey as leaves began to fall. The snows of winter would come soon. It was an area of endless lakes, rushing rivers, and deeply wooded wilderness.

Travelling would not be easy. The three family pets would have little chance of survival. They were used to being cared for and fed regularly by friendly people. Only trappers, Indians, and hunters used the vast forests, with a scattered farm here and there. The cold, forested hills and thinly-soiled valleys made a bleak and unfriendly landscape. It could support very few farms and families.

The bull terrier was old. He became exhausted and weak with hunger before the young labrador. On the third day he collapsed. He was helpless, starving, and quite unable to defend himself. The cat was tough, looking after both himself and his friend the terrier. A bear cub found the battered old dog. It made the mistake of teasing him. The cat, a scratching, spitting ball of rage, hissed with fury and attacked. The cub and mother bear fled in terror.

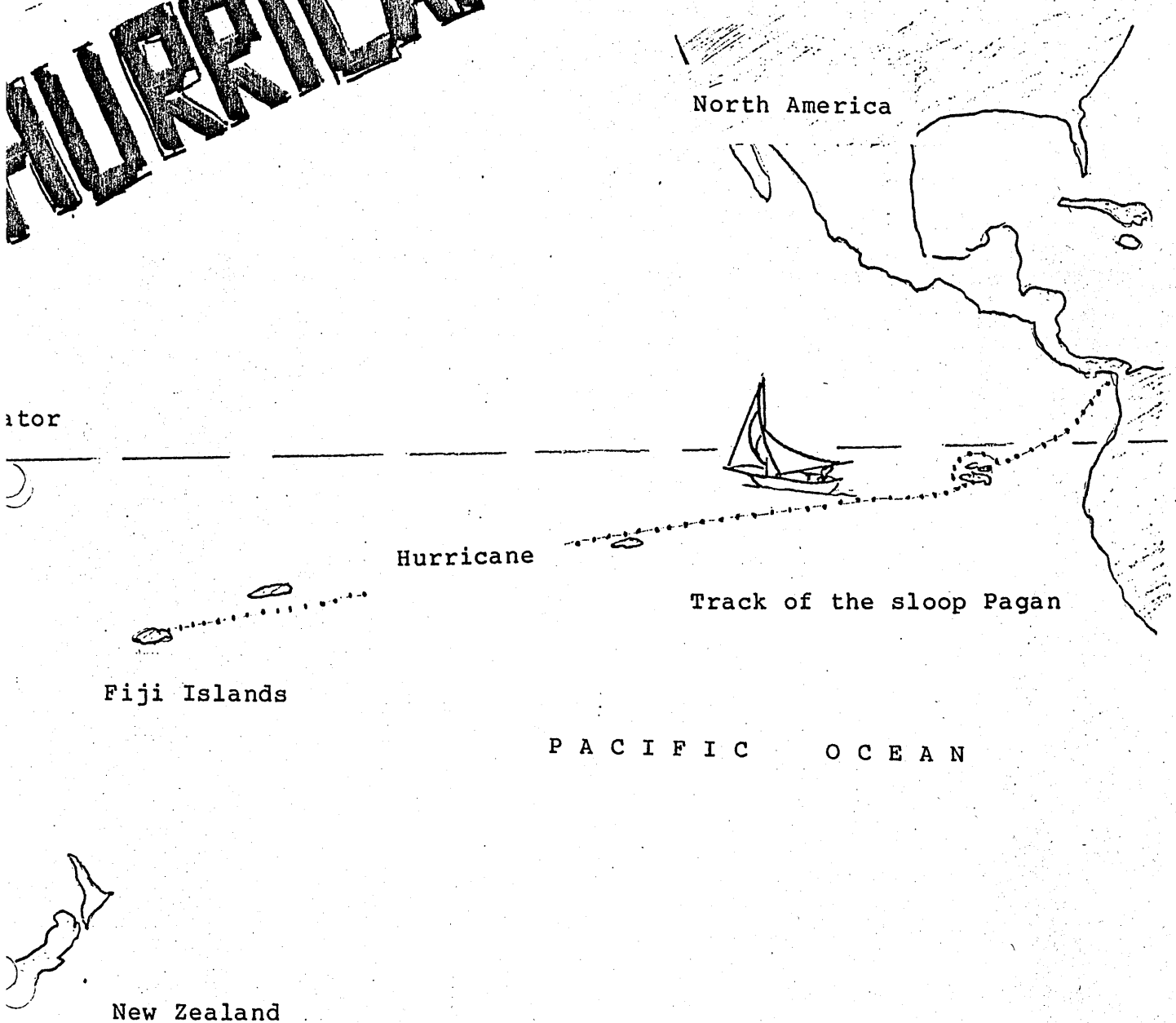


Food was an endless problem. The cat gave some of his

kills to his friend the old terrier. The labrador was starving. He took desperate risks to find food. The cat fed well and often. For the dogs, finding food was the greatest difficulty. Terriers and labradors are not hunters by nature. Driven by hunger, the labrador attacked a porcupine. These animals defend themselves with long barbed spikes. One embedded deeply into the dog's cheek, just below the eye. The wound swelled. Hunting became even more difficult. The dog could not see clearly and was in terrible pain.

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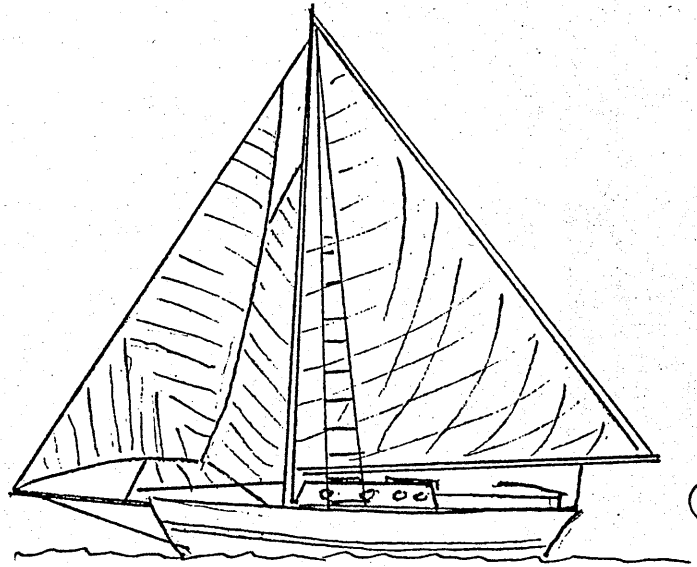
HURRICANE!



This is an account of a long and desperate voyage across the Pacific Ocean. It was made by a man called John Caldwell, trying to return home to his new wife after the war. He set out in a small sailing boat, alone, to sail from America to Australia.

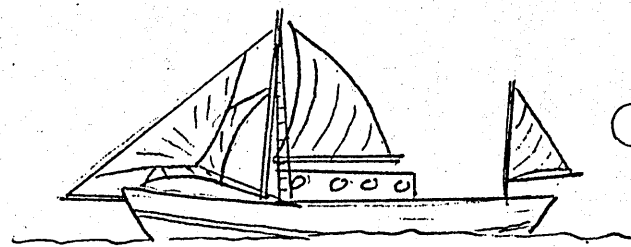
He did not know how to sail. He had to learn as he went along. He could not afford to waste any time. The hurricane season would start if his journey took too long. Dangers and

difficulties made the long journey tough and dangerous. He nearly lost his life several times while learning. He delayed for a precious week in the Perla Islands off Panama, to get some more practice before the ocean crossing. The danger of still being at sea in the hurricane season was increased. He spent as little time in the Perla Islands as possible.



Pagan before
the hurricane

Things went well at first. He picked up the steady easterly Trade Winds he needed. Then his luck ran out. His twenty-nine foot boat was savagely battered by a full hurricane. He lost his mast and rigging, and most of his food and water. He had supplies enough for only a week or so. His battered boat was still weeks away from the nearest land. He rationed himself very carefully. Still his food ran out completely hundreds of miles from land.



Pagan as she look
after repairs

He managed some rough repairs to his mast and sails. He

limped on towards the Fiji Islands in his broken boat. He had no food for weeks, even cutting up and chewing his belt and shoes, and very little water. He was very weak. When he was almost dead from his ordeal his boat, the Pagan, smashed into a coral reef off one of the Fiji Islands. Unconscious, he drifted ashore. He awoke on the beach the following morning. His problems were not over. He could find nothing to eat in the dense island jungle.

John Caldwell was a lucky man. Two days later some native children chose that bit of beach to play on. They saw his body, and ran for help. He was cared for and fed, slowly gathering strength. He was able to continue his journey, and meet again the new wife he had not seen for so long.

Part A:

Linking up: There are five unfinished sentences in the left hand column.
In the right hand column is a choice of sentence endings.
Choose the right ending to each sentence, and copy it onto your answer sheet.

BEGINNINGS	ENDINGS
<ul style="list-style-type: none">- John Caldwell did not know how to sail- He made the journey- He could not waste any time- He lost most of his food and water- His good luck returned after the wreck	<ul style="list-style-type: none">- although his wife was in Australia- because he was so weak and ill.- when his boat ran into a hurricane.- so he repaired the mast and rigging.- because the hurricane season would start soon.- because he rationed himself carefully.- because he delayed a week in the Perla Islands.- but he did not care very much.- so he had to learn as he went along.- when he was found by some children.- but he did not worry about it.- because he wished to see his wife- because he was hundreds of miles from land.- as there was no food where he landed on the island.

Part B:

Answer these questions:

1. Why did John Caldwell make the journey?
2. From which country did he start?
3. To which country was he going?
4. What was the name of his boat?
5. How long was his boat?
6. Give two reasons why he should not have made the journey when he did.
7. What happened to him before he arrived at the Perla Islands?
8. Why would he have been anxious during the week in the Perla Islands?
9. How do you know that hurricanes are expected every year in the Pacific Ocean?
10. What two parts of his boat were damaged in the hurricane?
11. What land was closest to him when the storm struck?
12. Roughly how far from land was he when his food ran out?
13. Did he have any water left when he was wrecked?
14. Describe, as fully as you can, the condition he was in when he reached Fiji.
15. How long was he ashore before being found?
16. Do you think he was conscious or unconscious when he was found?

Part A:

Linking up: There are five unfinished sentences in the left hand column.
In the right hand column is a choice of sentence endings.
Choose the right ending to each sentence, and copy it onto your answer sheet.

BEGINNINGS	ENDINGS
<ul style="list-style-type: none"> - The animals made this journey - The animals were used to being with people - There were few people in the area - The old dog was always hungry - The labrador found the journey hard 	<ul style="list-style-type: none"> - although they wanted to find their owners. - because the snows would soon come - although the cat sometimes gave him food. - because he got some food from the cat. - although he was injured by a porcupine. - because hunters, trappers and Indians used the forests. - because it was nearly winter. - because the cat gave him some of his own kills. - because of the poor soil. - because they had been left behind by the family. - so they found it hard to be alone. - so it was a hard and difficult area to travel across. - because he was the youngest. - because he was not a natural hunter, and he had no other food

Part B:

Answer these questions:

1. How many animals made the journey?
2. Which animal was the oldest?
3. What time of year were they travelling?
4. Why was this a bad time to be travelling?
5. What would have been the best time of year to travel?
6. Give two reasons why the bull terrier found the journey harder than the cat.
7. Give one reason why the labrador found the journey harder than the cat.
8. Why would the animals pass only a few farms on their journey?
9. Why would they pass no towns or villages?
10. (i) Which animal do you think enjoyed the journey most?
(ii) Explain why.
11. Why did the bull terrier not defend himself against the bear cub?
12. How did the cat feel when he saw the bear cub?
13. (i) Which animal was most often hungry?
(ii) Explain why.
14. Explain how the labrador was hurt.
15. The family had given the animals up as dead. Give reasons why this seemed likely.
16. The cat was first to find the family. Which animal was second?

"ANIMALS ON THE MOVE"

Red Test Answer Form

NAME: _____ GROUP 1/2: _____

AGE: _____ BOY / GIRL: _____

Part A:

The animals made this journey _____

The animals were used to being with people _____

There were few people in the area _____

The old dog was always hungry _____

The labrador found the journey hard _____

Part B:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

"HURRICANE!"

Blue Test Answer Form

NAME: _____ GROUP 1/2: _____

AGE: _____ BOY / GIRL: _____

Part A:

John Caldwell did not know how to sail _____

He made the journey _____

He could not waste any time _____

He lost most of his food and water _____

His good luck returned after the wreck _____

Part B:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

APPENDIX FOUR.

**Experimental material from
Study Four.**

Appendix 4A

The two texts are shown here with the target propositions bracketed and underlined. In the High Difficulty version, the propositions remain explicitly in the text; in the Low Difficulty version they are omitted, and remain implicit.

SAFETY AND COMFORT IN THE AIR

Air travel in the past was expensive, unreliable, and uncomfortable. Today it is comfortable, safe, and quick.

A comfortable and safe flight:

Passengers expect to be well looked after during their flight. (The people who look after the passengers are called the cabin staff.) Cabin staff are highly trained and well paid. Pilots are even more carefully trained. Poor eyesight, slow reactions, or bad hearing - it would be very dangerous if a pilot had any of these. (People who would not be good get weeded out during the training.) At the end of the long training, only the best become pilots. When the aircraft is on the ground between flights, its engines and electrical systems are checked over by ground staff. (If anything went wrong in the air, it might cause a crash.) Every piece of equipment and machinery must work perfectly when the aircraft is in the air. An aircraft may land at, say, 5 o'clock. It will be low on food, fuel and stores, and it will need cleaning and checking before the next flight. (It has to be got ready for its next flight very quickly.) By 5.30, it may have to be ready for take-off again. Hot meals are served to passengers during the flight. (These are

not cooked on board). They are delivered ready to serve when the aircraft is still at the airport.

A screen at the front of the cabin is used to show films during the flight, but perhaps not all the passengers will want a film. (The soundtrack of the film is listened to using earphones.) Those who don't want it leave their earphones off. On long flights, aircraft may have to land at one or two other airports on the way. (They refuel at these airports.) Even a modern aircraft does not carry enough fuel for a really long trip.

If things go wrong:

Every airport has its own fire and rescue services. (They have to be ready at every take-off and landing.) Take-off and landing are the most dangerous moments of any flight. Every seat in the aircraft has a belt, to hold the passenger if there is a crash. (These have to be worn at take off and landing.) Again, it is at take-off and landing that the risk of a crash is greatest. Crashes are very unusual, and can be caused by equipment failure, or by human error. (Human error is the cause of most crashes.) The equipment is very carefully checked, so it very seldom goes wrong. Every aircraft carries a flight recorder, called the 'black box'. (It records every thing that happens during a flight, and might explain what caused a crash.) Experts always search for it in the wreckage after a crash. Every crash is always very carefully investigated by by crash investigators. (If they can find out what happened to cause the crash, they might be able to stop it happening again.) An air crash is a particularly terrible thing, and every

possible way of preventing another is looked for. In the recent Manchester airport disaster, when many people died, the burning aircraft quickly filled with smoke. (Smoke hoods would have saved many lives.) Now, smoke hoods are being made, so that every passenger will have one if needed. The cabin staff are trained to deal with the passengers in an emergency. (They are in charge of getting the passengers off the aircraft if something goes wrong.) The other crew members, like the pilot and engineer, would be too busy with the aircraft.

Lots of people are scared of air travel, but hundreds of thousands of people travel by air every day of the year, and there are very few crashes. (Air travel is one of the safest ways of travelling.) On the roads, though, hundreds of people are killed every day.

Fifty years ago, very few people used air travel; today, quite a lot have travelled by air. Perhaps, in the future, aeroplanes will be as common as the family car!

AT THE AIRPORT

Hundreds of thousands of people pass through airports every day. An airport has to be very well organised, if all those people are to get to the right aeroplane at the right time.

Before and After Your Flight:

First you have to get to the airport. People do not like the noise made by aircraft taking off and landing. (New airports are built well away from the middle of cities, and crowded areas.) People want new airports, but not near where lots of people are living. A great many people travel to the airport in their own cars. (They leave them parked at the airport all the time they are away.) This means a lot of carparking space is needed near the airport, where cars can be left for a long time, perhaps several weeks.

At any time there are always hundreds of passengers waiting at an airport. (Many have something to eat or drink while they wait.) Restaurant, cafeteria and bar staff are kept very busy, day and night. Most airports have shops, that sell all kinds of things passengers might want. (Airport shops are usually very busy.) There are plenty of people with money in their pockets, time to spend while they wait for their flight, and who are in a spending mood

On ships, each passenger can take as much luggage as he wants. That could be dangerous on an aircraft. (Each passenger is allowed to take only a certain weight of luggage.) The airline has to be very careful that the aircraft is not carrying too much weight. Computer displays

are the best way of showing information that is changing rapidly. (Flight information is shown on computer displays.) Passengers need to know the latest information about their flights as soon as they arrive at the airport.

There are many different kinds of jobs at airports. Terrorists are people who will attack anyone, just to get publicity for their cause. (Some airports have been attacked by terrorists.) Now, because of what has happened at airports, armed guards patrol among the waiting passengers. Some passengers are seen by Customs Officers when they get off the aircraft. (Customs Officers see all passengers coming off flights from foreign countries.) Their job is to stop people smuggling things in from foreign countries. A journey is not finished when a traveller lands at an airport. (Often, a taxi or hired car is needed to finish the journey.) Taxis and hire cars do good business at airports.

The airport:

There has to be one central place, where everything that happens is controlled. (The control tower is this place.) The control tower is always placed where it has a view of all the runways and approaches. This is where the Air Traffic Controllers control the aircraft. Air Traffic Controllers have to concentrate hard on their radar screens. (They must not get tired.) They are not allowed to spend too long working without a break. They are under great pressure and strain while they work. (A single mistake could cause a terrible crash.) The sky above the airport is crowded with aircraft which depend on their controller's orders. Each of those aircraft may have hundreds of people on board.

In the past, before radar became as good as it is now, fog and mist closed airports. (Today's airports have radar systems to guide aircraft in even when the pilot can see very little.) Nowadays, aircraft can take off and land in quite thick fog. In countries where there is snow, every airport has its own snow ploughs and snow clearing machines. (The ploughs and machines keep the runways clear while it is snowing.) Even in quite heavy snow, flights manage to get away on time.

But even the best technology cannot always beat nature. (Flights are still occasionally grounded by bad weather.) Sometimes, on the radio, you hear travellers being advised to contact the airport to find out when their flight might get away.

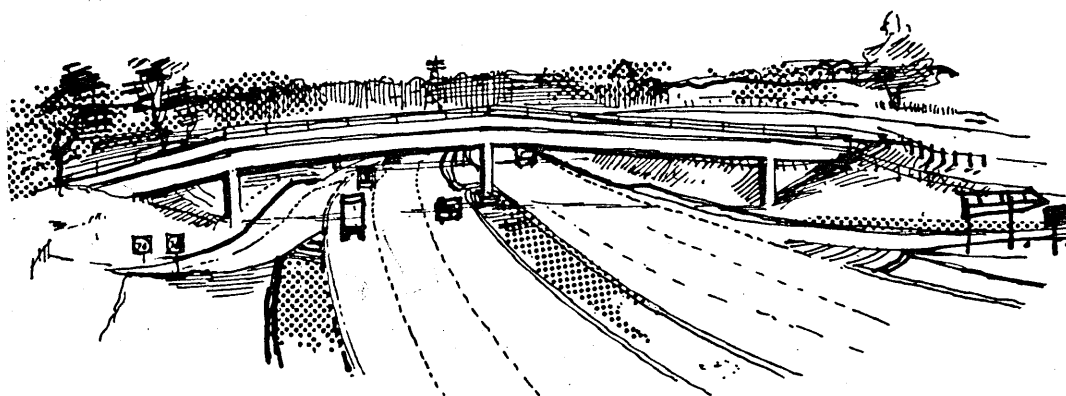
But usually, everything goes as planned, and the time you spend at the airport can be as enjoyable and exciting as the journey itself.

AT THE AIRPORT

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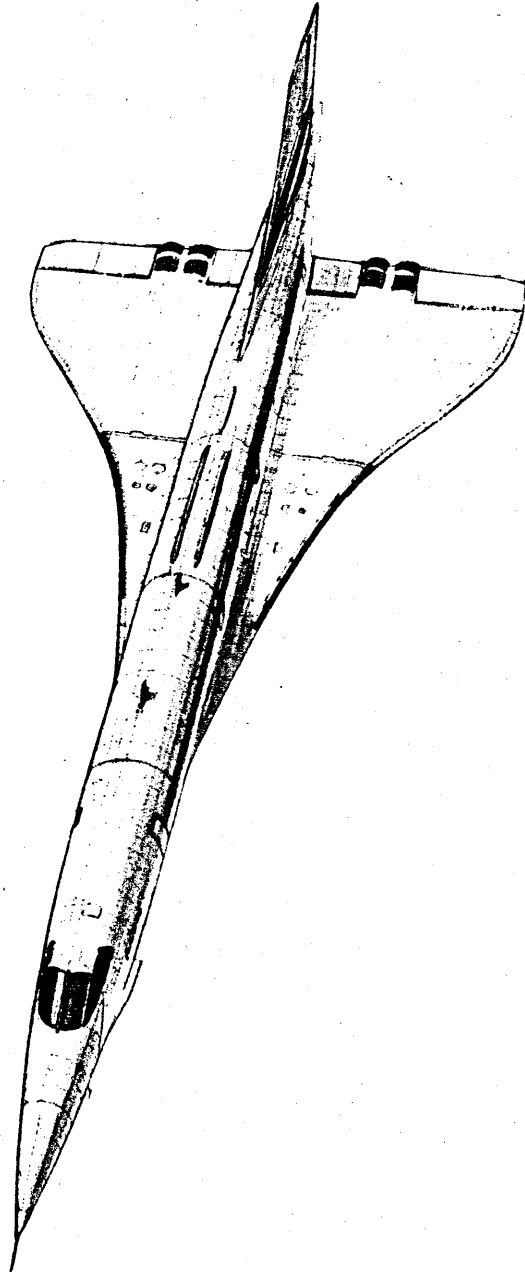
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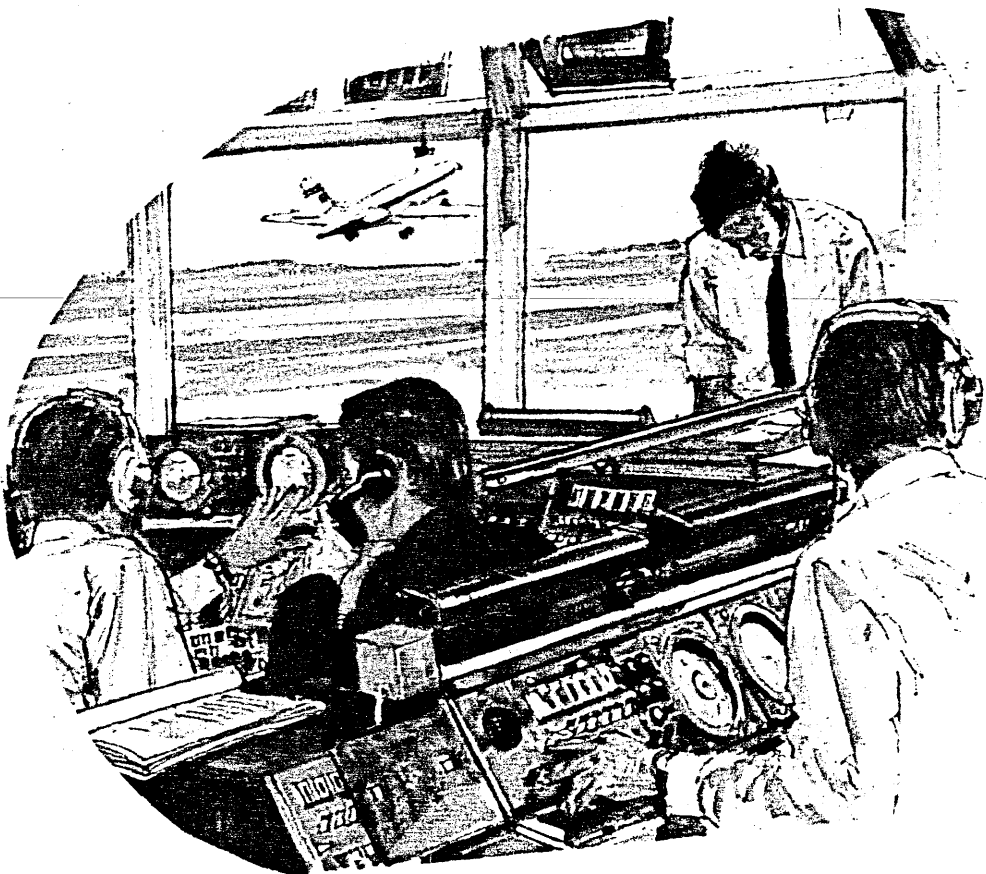
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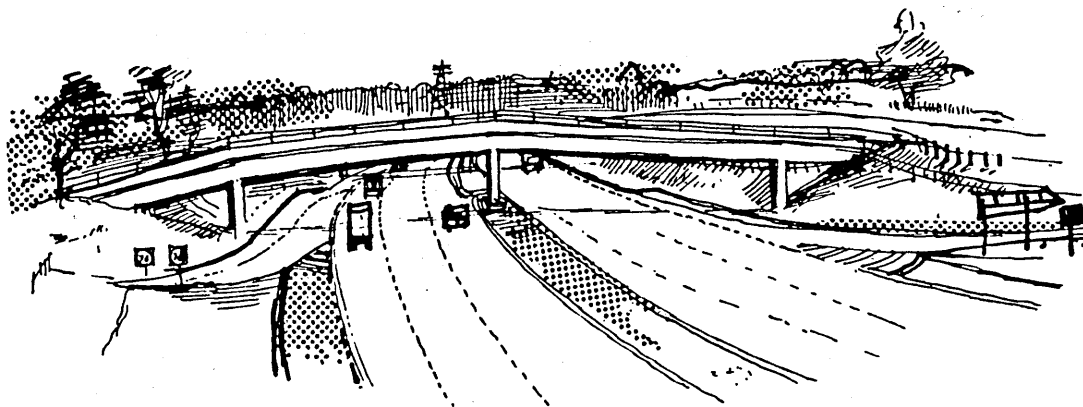


AT THE AIRPORT

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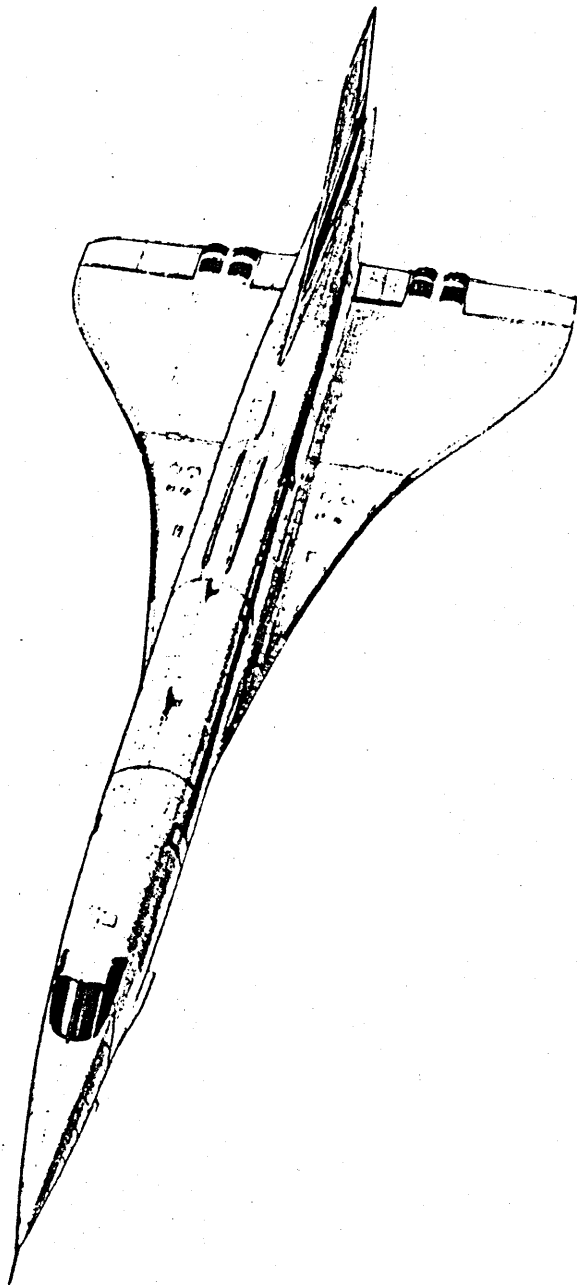
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First you have to get to the airport. People do not like the noise made by aircraft taking off and landing. People want new airports, but not near where lots of people are living. A great many people travel to the airport in their own cars. This means a lot of carparking space is needed near the airport, where cars can be left for a long time, perhaps several weeks.



At any time there are always hundreds of passengers waiting at an airport. Restaurant, cafeteria and bar staff are kept very busy, day and night. Most airports have shops, that sell all kinds of things passengers might want. There are plenty of people with money in their pockets, time to

spend while they wait for their flight, and who are in a spending mood



On ships, each passenger can take as much luggage as he wants. That could be dangerous on an aircraft. The airline has to be very careful that the aircraft is not carrying too much weight. Computer displays are the best way of showing information that is changing rapidly.

Passengers need to know the latest information about their flights as soon as they arrive at the airport.

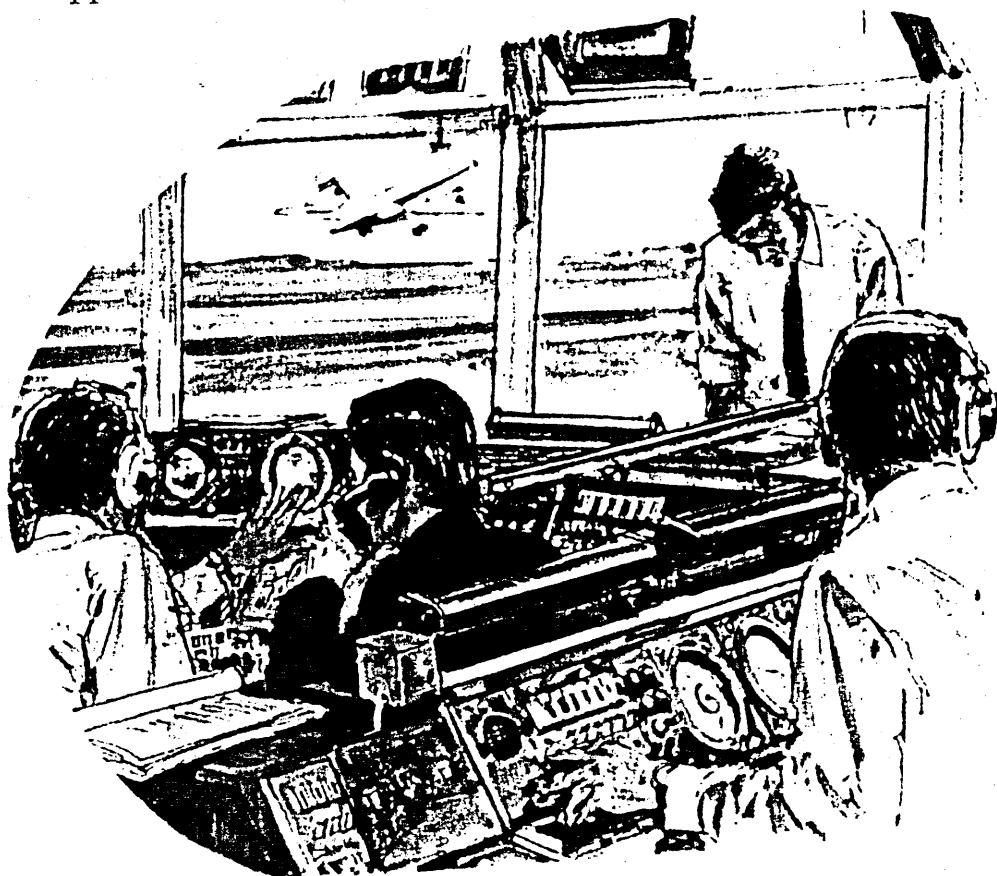
There are many different kinds of jobs at airports. Terrorists are people who will attack anyone, just to get publicity for their cause. Now, because of

what has happened at airports, armed guards patrol among the waiting passengers. Some passengers are seen by Customs Officers when they get off the aircraft. Their job is to stop people smuggling things in from foreign countries. A

journey is not finished when a traveller lands at an airport. Taxis and hire cars do good business at airports.

The airport:

There has to be one central place, where everything that happens is controlled. The control tower is always placed where it has a view of all the runways and approaches.

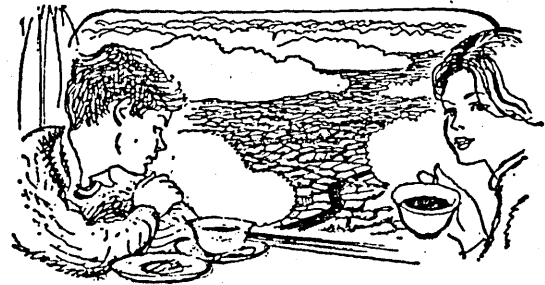


This is where the Air Traffic Controllers control the aircraft. Air Traffic Controllers have to concentrate hard on their radar screens. They are not allowed to spend too long working without a break. They are under great pressure and strain while they work. The sky above the airport is crowded with aircraft which depend on their controller's orders. Each of those aircraft may have hundreds of people on board.

In the past, before radar became as good as it is now, fog and mist closed airports. Nowadays, aircraft can take off and land in quite thick fog. In countries where there is snow, every airport has its own snow ploughs and snow clearing machines. Even in quite heavy snow, flights manage to get away on time.

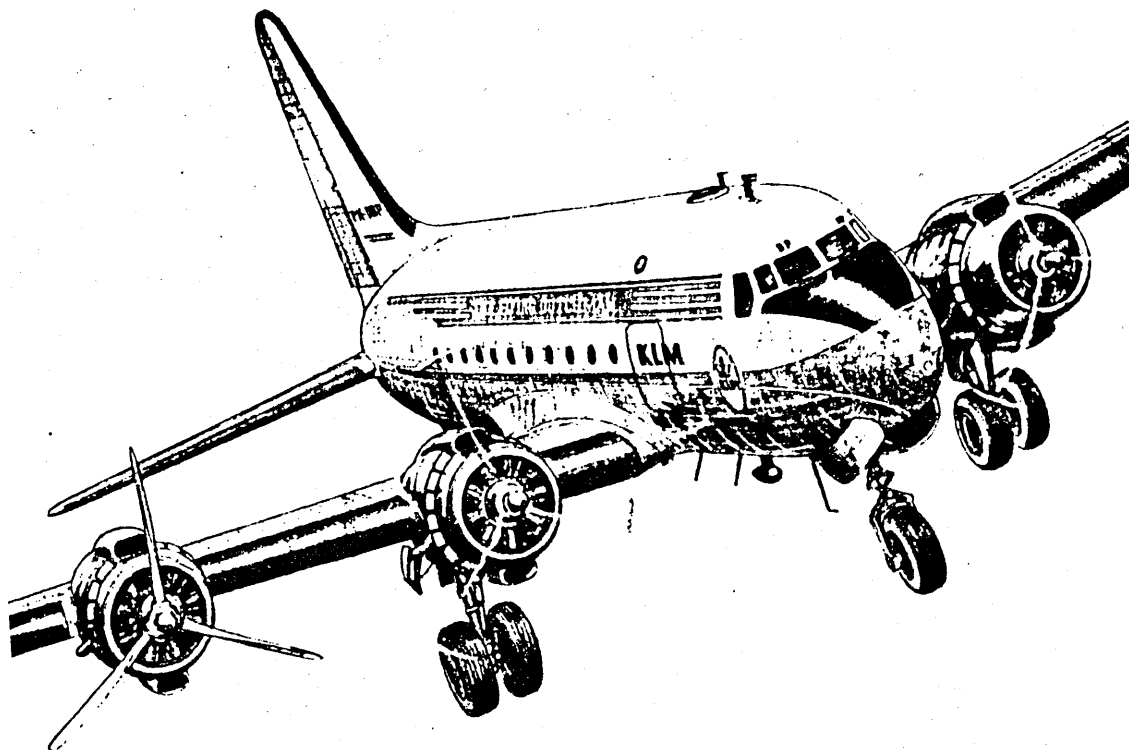
But even the best technology cannot always beat nature. Sometimes, on the radio, you hear travellers being advised to contact the airport to find out when their flight might get away.

But usually, everything goes as planned, and the time you spend at the airport can be as enjoyable and exciting as the journey itself.



SAFETY AND COMFORT IN THE AIR

Air travel in the past was expensive, unreliable, and uncomfortable. Today it is comfortable, safe, and quick.



A comfortable and safe flight:

Passengers expect to be well looked after during their flight. Cabin staff are highly trained and well paid. Pilots are even more carefully trained. Poor eyesight, slow reactions, or bad hearing - it would be very dangerous if a pilot had any of these. At the end of the long training, only the best become pilots. When the aircraft is on the ground between flights, its engines and electrical systems are checked over by ground staff. Every piece of

equipment and machinery must work perfectly when the aircraft is in the air. An aircraft may land at, say, 5 o'clock. It will be low on food, fuel and stores, and it will need cleaning and checking before the next flight. By 5.30, it may have to be ready for take-off again. Hot meals are served to passengers during the flight. They are delivered ready to serve when the aircraft is still at the airport.

A screen at the front of the cabin is used to show films during the flight, but perhaps not all the passengers will want a film. Those who don't want it leave their earphones off. On long flights, aircraft may have to land at one or two other airports on the way. Even a modern aircraft does not carry enough fuel for a really long trip.

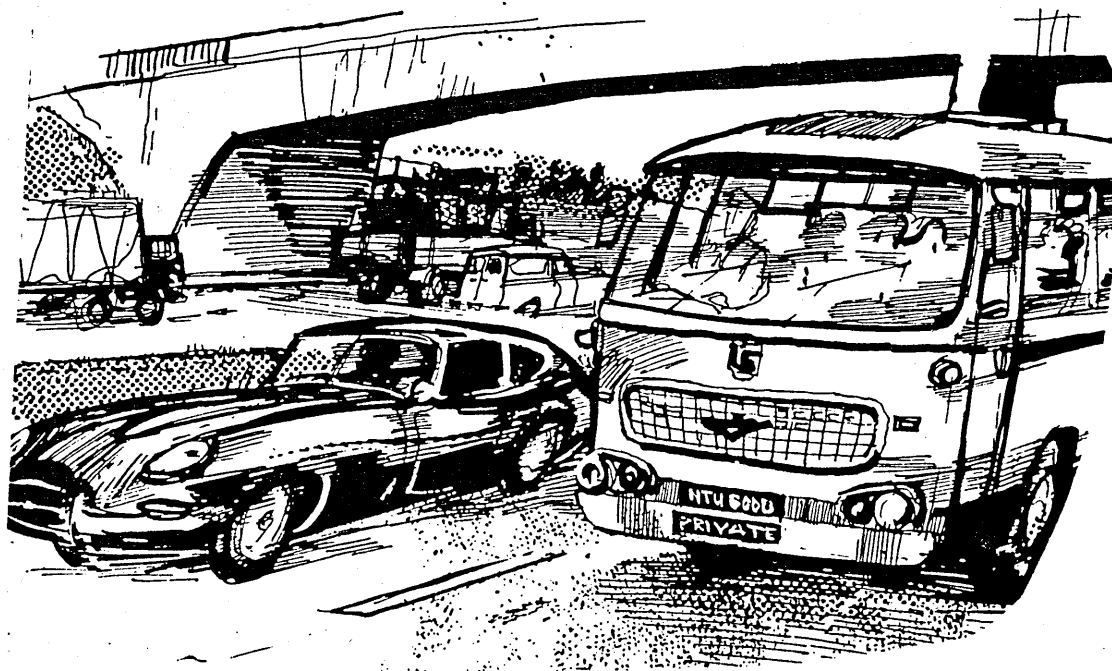
If things go wrong:

Every airport has its own fire and rescue services. Take-off and landing are the most dangerous moments of any flight. Every seat in the aircraft has a belt, to hold the passenger if there is a crash. Again, it is at take-off and landing



that the risk of a crash is greatest. Crashes are very unusual, and can be caused by equipment failure, or by human error. The equipment is very carefully checked, so it very seldom goes wrong. Every aircraft carries a flight recorder, called the 'black box'. Experts always search for it in the wreckage after a crash. Every crash is always very carefully investigated by crash investigators. An air crash is a particularly terrible thing, and every possible way of preventing another is looked for. In the recent Manchester airport disaster, when many people died, the burning aircraft quickly filled with smoke. Now, smoke hoods are being made, so that every passenger will have one if needed. The cabin staff are trained to deal with the passengers in an emergency. The other crew members, like the pilot and engineer, would be too busy with the aircraft.

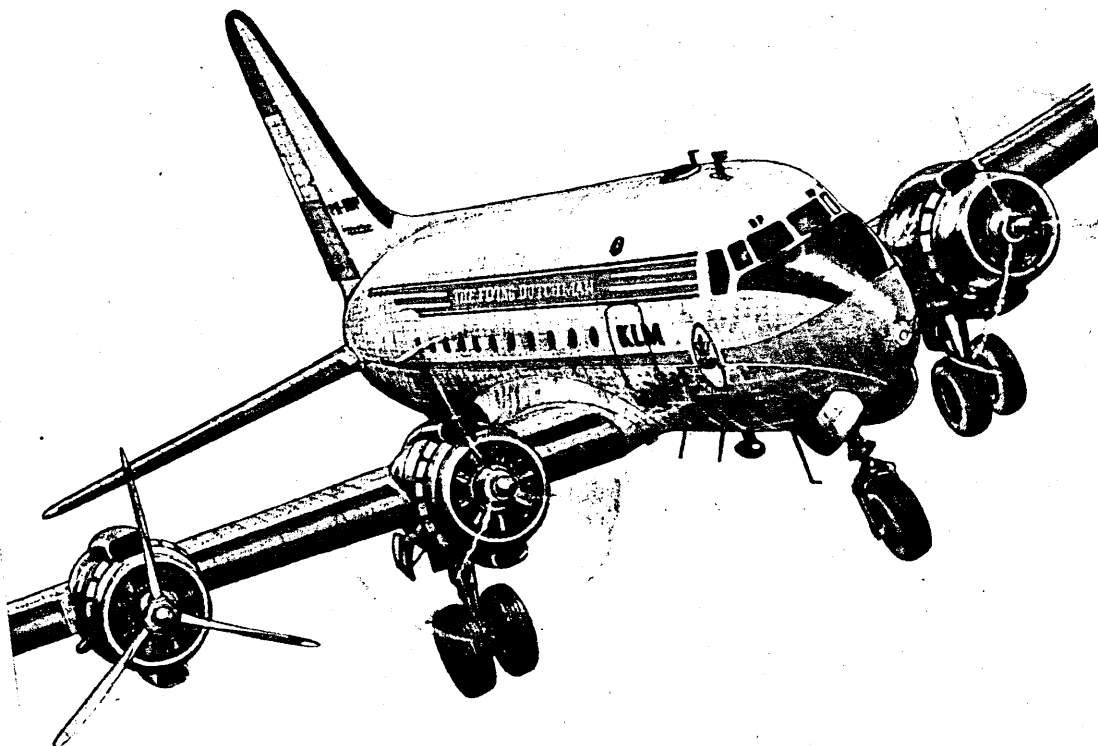
Lots of people are scared of air travel, but hundreds of thousands of people travel by air every day of the year, and there are very few crashes. On the roads, though, hundreds of people are killed every day.



Fifty years ago, very few people used air travel;
today, quite a lot have travelled by air. Perhaps, in the
future, aeroplanes will be as common as the family car!

SAFETY AND COMFORT IN THE AIR

Air travel in the past was expensive, unreliable, and uncomfortable. Today it is comfortable, safe, and quick.



A comfortable and safe flight:

Passengers expect to be well looked after during their flight. The people who look after the passengers are called the cabin staff. Cabin staff are highly trained and well paid. Pilots are even more carefully trained. Poor eyesight, slow reactions, or bad hearing - it would be very dangerous if a pilot had any of these. People who would not be good get weeded out during the training. At the end of the long training, only the best become pilots. When the aircraft is on the ground between flights, its engines and

electrical systems are checked over by ground staff. If anything went wrong in the air, it might cause a crash. Every piece of equipment and machinery must work perfectly when the aircraft is in the air. An aircraft may land at, say, 5 o'clock. It will be low on food, fuel and stores, and it will need cleaning and checking before the next flight. It has to be got ready for its next flight very quickly. By 5.30, it may have to be ready for take-off again. Hot meals are served to passengers during the flight. These are not cooked on board. They are delivered ready to serve when the aircraft is still at the airport.

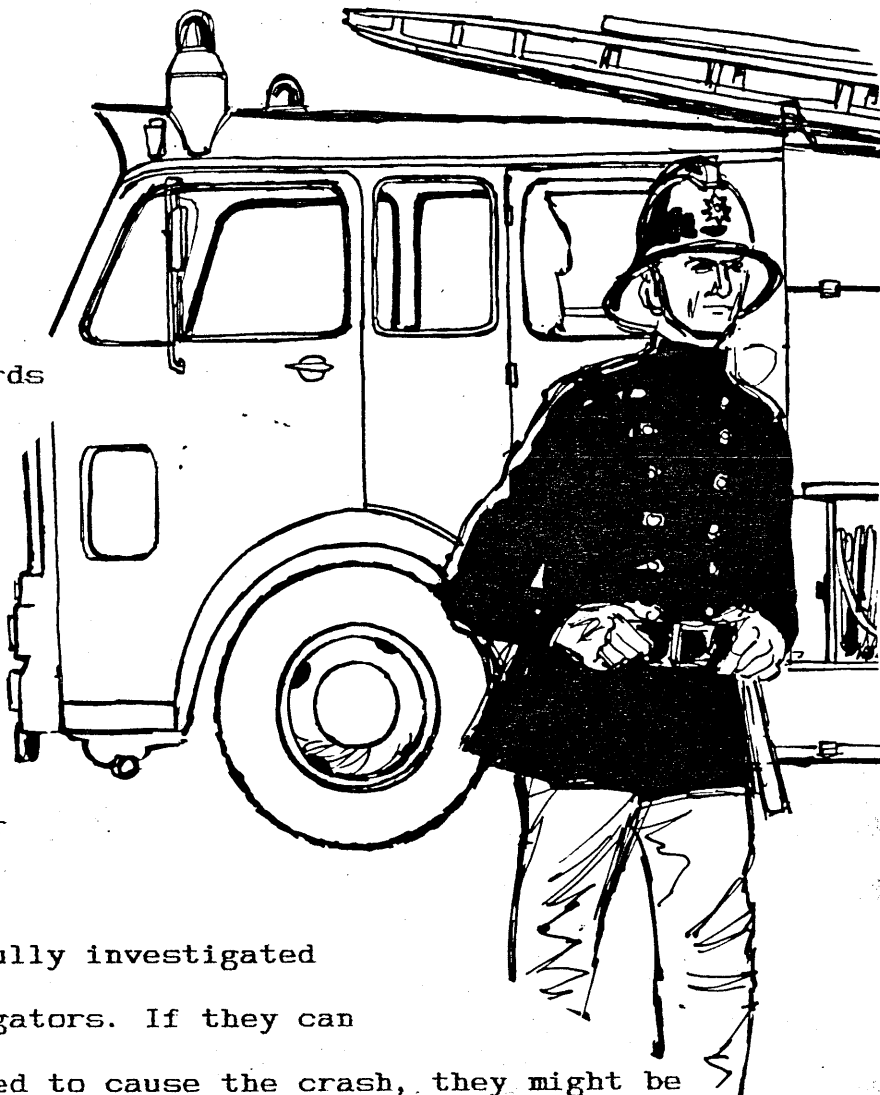
A screen at the front of the cabin is used to show films during the flight, but perhaps not all the passengers will want a film. The soundtrack of the film is listened to using earphones. Those who don't want it leave their earphones off. On long flights, aircraft may have to land at one or two other airports on the way. They refuel at these airports. Even a modern aircraft does not carry enough fuel for a really long trip.

If things go wrong:

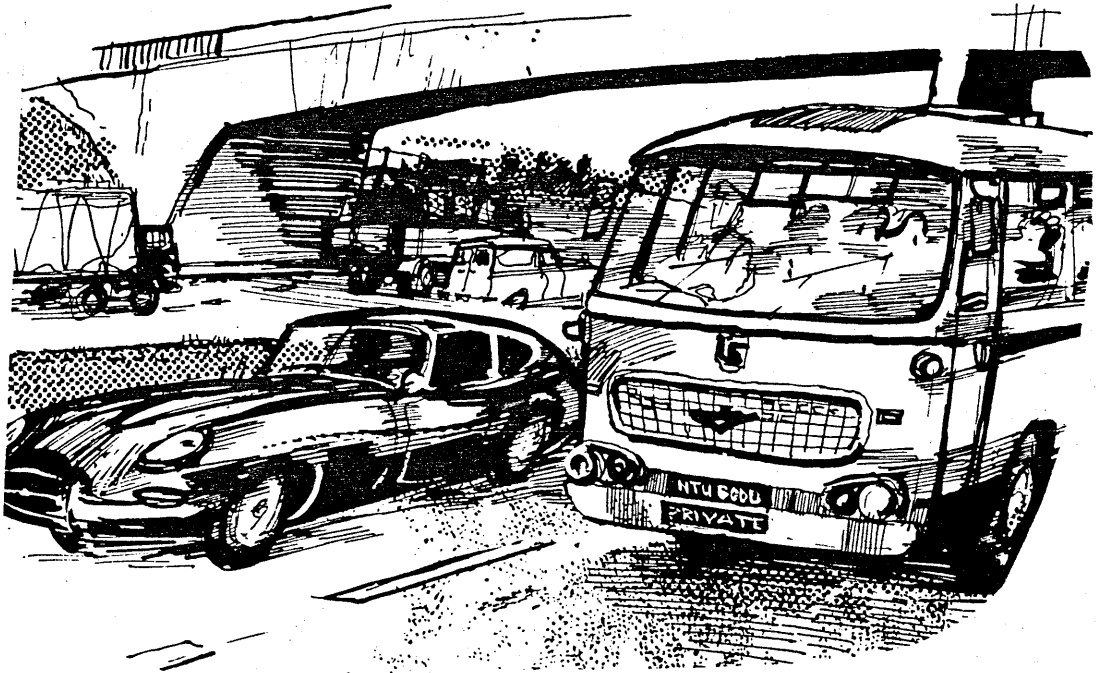
Every airport has its own fire and rescue services. They have to be ready at every take-off and landing. Take-off and landing are the most dangerous moments of any flight. Every seat in the aircraft has a belt, to hold the passenger if there is a crash. These have to be worn at take-off and landing. Again, it is at take-off and landing that the risk of a crash is greatest. Crashes are very unusual, and can be caused by equipment failure, or by human error. Human error is the cause of most crashes.

The equipment is very carefully checked so it very seldom goes wrong. Every aircraft carries a flight recorder, called the 'black box'. It records every thing that happens during a flight, and might explain what caused a crash. Experts always search for it in the wreckage after a crash. Every crash is always very carefully investigated

by crash investigators. If they can find out what happened to cause the crash, they might be able to stop it happening again. An air crash is a particularly terrible thing, and every possible way of preventing another is looked for. In the recent Manchester airport disaster, when many people died, the burning aircraft quickly filled with smoke. Smoke hoods would have saved many lives. Now, smoke hoods are being made, so that every passenger will have one if needed. The cabin staff are trained to deal with the passengers in an emergency. They are in charge of getting the passengers off the aircraft if something goes wrong. The other crew members, like the pilot and engineer, would be too busy with the aircraft.



Lots of people are scared of air travel, but hundreds of thousands of people travel by air every day of the year, and there are very few crashes. Air travel is one of the safest ways of travelling. On the roads, though, hundreds of people are killed every day.



Fifty years ago, very few people used air travel; today, quite a lot have travelled by air. Perhaps, in the future, aeroplanes will be as common as the family car!

Test for AT THE AIRPORT

Part 1:

In each of these questions, there are three answers to choose from. One is a good answer; put a tick on the answer sheet to show the good answer. One may be alright, but it is not such a good answer; put a question mark to show that one. One is a wrong answer; put a cross to show which is the bad answer.

Here is an example:

Question.

1. An airport is

- (a) a place where there are often lots of people waiting
- (b) a place where aircraft land and take off, and the passengers get on and off
- (c) a place where people like to live because of the noise.

Answer.

1.

a	?
b	✓
c	X

alright, but not so good
good answer
Wrong

Questions.

1. Airports are noisy places
 - (a) and people like to live as close to them as possible
 - (b) so they cannot be built just anywhere
 - (c) so they have to be built well away from where people live
2. Some people travel to the airport in their own cars
 - (a) and use them again to return home
 - (b) but they cannot leave them at the airport
 - (c) and they leave them in the airport car park ready for them when they get back
3. Passengers who are waiting for their flights
 - (a) often want a meal or a snack or something to eat
 - (b) do not have time for any refreshments
 - (c) may get hungry while they wait
4. The shops at airports
 - (a) can be quite busy sometimes
 - (b) are very busy and well used by passengers waiting for their flights
 - (c) are always near the cafeteria and restaurants, because this is easiest for the passengers

5. Too much weight would be dangerous for an aircraft
 - ✓(a) so there is a weight limit for each passenger's luggage
 - ✓(b) but passengers are allowed as much luggage as they think they need
 - ✓(c) so weights are checked carefully
6. To find out everything about their flight
 - (a) passengers look at the computer display when they arrive at the airport
 - (b) passengers telephone the airport before setting out
 - (c) passengers check the details when they get to the airport
7. Waiting passengers are protected by armed guards at many airport
 - (a) because there have been terrorist attacks on airports
 - (b) because there may be some danger from terrorists
 - (c) because it makes passengers feel safe, although there is no real danger to them
8. To stop things being smuggled into the country
 - (a) Customs Officers work at airports
 - (b) armed guards patrol among the passengers
 - (c) all passengers from abroad are seen by Customs Officers
9. To finish their journey after they have arrived at the airport
 - (a) lots of passengers hire a car or take a taxi
 - (b) people need some way of getting home
 - (c) passengers often have to wait hours for a bus, or walk home
10. The central control point at an airport
 - (a) is where the passengers wait for their flight
 - (b) is called the control tower
 - (c) is an important place
11. Air Traffic Controllers work for only a short spell at a time
 - (a) because the work is so hard
 - (b) because they have to stay fresh and alert, and the job is very demanding
 - (c) because the control tower is placed where it has a view of the whole airport
12. Being an Air Traffic Controller is a responsible and stressful job
 - (a) because the training is so long and difficult
 - (b) because it is such an important one
 - (c) because even a small mistake could cause many deaths

13. In misty and foggy conditions
- (a) airports usually close down , and stop all flights until it is safe again
 - (b) aircraft can be guided in and out by radar, so that the airport can stay open even when it is quite bad
 - (c) the airport may have to close, but it may be able to stay open
14. When there is heavy snow at the airport
- (a) the airport has to close, because the runways are blocked
 - (b) some flights still manage to get in and out
 - (c) most flights are kept going by using snow clearing equipment on the runways
15. Modern equipment helps airports stay open to flights
- (a) all the time, whatever the weather
 - (b) for most of the time, even in quite bad weather
 - (c) for some of the time

Part 2:

Here are five paragraphs about the passage.

One is right, and explains exactly what the passage was about.

The others have some mistakes: one has one mistake in it, one has two, one has three, and another has four mistakes in it.

On your answer sheet, put them into the right order, with the right one first, and the one with most mistakes last.

1. Passengers are not very well looked after while they wait at airports. Although there are no car parks where they can leave their cars while they are away, they can hire taxis or hire cars to finish their journey when they get back. But they cannot have anything to eat or drink while they wait, and the airport shops are not well used. They have to telephone the airport before setting out to get the latest information about their flight.

2. Passengers are well looked after while they wait at airports. Although there are no car parks where they can leave their cars while they are away, they can hire taxis or hire cars to finish their journey when they get back. Although they cannot have anything to eat or drink while they wait, the airport shops are kept very busy. A computer display gives them the latest information about their flight.

3. Passengers are well looked after while they wait at airports. Although there are no car parks where they can leave their cars while they are away, they can hire taxis or hire cars to finish their journey when they get back. They can have something to eat or drink while they wait, and the airport shops are kept very busy. A computer display gives them the latest information about their flight.
4. Passengers are well looked after while they wait at airports. There are large car parks where they can leave their cars while they are away, or they can hire taxis or hire cars to finish their journey when they get back. They can have something to eat or drink while they wait, and the airport shops are kept very busy. A computer display gives them the latest information about their flight.
5. Passengers are not very well looked after while they wait at airports. Although there are no car parks where they can leave their cars while they are away, they can hire taxis or hire cars to finish their journey when they get back. They cannot have anything to eat or drink while they wait, and the airport shops are not well used. A computer display gives them the latest information about their flight.

Part 3:

Answer these questions.

1. How does the airline limit the weight taken on board ?
2. Why are Air Traffic Controllers only allowed to work in short shifts ?
3. How are modern airports kept open in fog and mist ?
4. Which passengers are seen by Customs Officers ?
5. How do airports try to keep open while it is snowing ?

Test for SAFETY AND COMFORT IN THE AIR

Part 1:

In each of these questions, there are three answers to choose from. One is a good answer; put a tick on the answer sheet to show the good answer. One may be alright, but it is not such a good answer; put a question mark to show that one. One is a wrong answer; put a cross to show which is the bad answer.

Here is an example:

Question.

1. An airport is
 - (a) a place where there are often lots of people waiting
 - (b) a place where aircraft land and take off, and the passengers get on and off
 - (c) a place where people like to live because of the noise.

Answer.

1.

a	?
b	✓
c	×

alright, but not so good

good answer

wrong

Questions:

1. Passengers are looked after during the flight by
 - (a) the aircraft's cabin staff
 - (b) airport ground staff
 - (c) the crew of the aircraft
2. You can be sure the pilot is good at his job because
 - (a) being a pilot is a difficult job
 - (b) people who are not good enough do not get through the training
 - (c) the aircraft is well checked over by the ground staff
3. The electrical equipment and engines are carefully checked by ground staff between flights because
 - (a) anything failing in the air may well cause a crash
 - (b) pilots are very highly trained and well paid
 - (c) their job is to check these things
4. After an aircraft has landed
 - (a) hot meals are served to passengers
 - (b) it is cleaned by ground staff
 - (c) it has to be fully prepared for take-off again very quickly

5. The food that passengers are given during the flight
 - (a) is hot, well-cooked, and enjoyed by the passengers
 - (b) is not prepared on the aircraft
 - (c) is cooked and served by the cabin staff
6. Passengers who want the film during the flight
 - (a) may watch only a part of it
 - (b) can only see it if they go to the right part of the aircraft
 - (c) listen to it by using their earphones
7. Long distance flights stop at airports on the way
 - (a) to give the passengers a chance to stretch their legs
 - (b) because it is too far to go without a stop
 - (c) because they need more fuel to continue the journey
8. The airport's fire and rescue service
 - (a) is on high alert as aircraft take-off and land
 - (b) have to look for the flight recorder first
 - (c) is ready to help if there is an accident as aircraft touch down
9. Passengers wear seat belts
 - (a) sometimes during the flight
 - (b) only during the landing, when the risk of crash is greatest
 - (c) as the aircraft is landing and taking off
10. Air crashes are usually caused by
 - (a) things like human error and equipment failure
 - (b) people's mistakes, rather than equipment failure
 - (c) equipment failure, although the equipment has been so carefully checked
11. The 'black box' flight recorder is searched for after a crash
 - (a) only if it was a crash that happened during take-off or landing
 - (b) because it has a record of what happened
 - (c) because it might help the investigators understand why the crash happened
12. Crashes are investigated very carefully
 - (a) to try to stop more crashes of the same kind
 - (b) by the airport's fire and rescue service
 - (c) because they are so terrible
13. When an aircraft fills with smoke
 - (a) having a special hood for each passenger would save a lot of lives
 - (b) it is dangerous for the passengers
 - (c) smoke hoods do not help, as was shown at Manchester

14. When something does go wrong
(a) the crew of the aircraft help to save the passengers
(b) it is the cabin staff's job to deal with the passengers
(c) the passengers have to put on their seat belts
15. Many people are scared of flying
(a) but it is really much safer than driving
(b) because it is so much more dangerous than travelling on the roads
(c) but they need not be as scared as they are

Part 2:

Here are five paragraphs about the passage.

One is right, and explains exactly what the passage was about.

The others have some mistakes: one has one mistake in it, one has two, one has three, and another has four mistakes.

On your answer sheet, put them into the right order, with the right one first, and the one with most mistakes last.

1. Passengers are well looked after in the air. They are served with hot meals during the flight, which are cooked on board. To help pass the long hours, they can watch films; they listen to the soundtrack through earphones. Although air travel is one of the safest ways of travelling, crashes do happen, and seat belts have to be worn at all times during the flight. Most crashes are caused by people making a mistake, rather than equipment failure.

2. Passengers are well looked after in the air. They are served with hot meals during the flight, which are cooked on board. To help pass the long hours, they can watch films; they listen to the soundtrack through earphones. Although air travel is one of the safest ways of travelling, crashes do happen, so seat belts have to be worn at take-off and landing. Most crashes are caused by people making a mistake, rather than equipment failure.

- | | |
|----|--|
| 3. | Passengers are well looked after in the air. They are served with hot meals during the flight, though the food is not cooked on board. To help pass the long hours, they can watch films; they listen to the soundtrack through earphones. Although air travel is one of the safest ways of travelling, crashes do happen, so seat belts have to be worn at take-off and landing. Most crashes are caused by people making a mistake, rather than equipment failure. |
| 4. | Passengers are well looked after in the air. They are served with hot meals during the flight, which are cooked on board. To help pass the long hours, they can watch films; they listen to the soundtrack through earphones. Because air travel is not one of the safest ways of travelling, seat belts have to be worn at all times during the flight. Most crashes are caused by equipment failure, rather than people making a mistake. |
| 5. | Passengers are well looked after in the air. They are served with hot meals during the flight, which are cooked on board. To help pass the long hours, they can watch films; they listen to the soundtrack through earphones. Because air travel is not one of the safest ways of travelling, seat belts have to be worn at all times during the flight. Most crashes are caused by people making a mistake, rather than equipment failure. |

Part 3:

Answer these questions.

1. What does 'cabin staff' mean ?
2. They have a special job if there is an emergency. What is it ?
3. Why is everything checked so carefully while the aircraft is on the ground between flights ?
4. Why is the 'Black Box' always searched for after a crash ?
5. How do you know that the pilot will be good at his job ?

Blue Test Answer Sheet: 'At the Airport'

NAME: _____ BOY/GIRL: _____

AGE: _____ GROUP1/GROUP 2: _____

Part 1:

*In each of these questions there is one good answer;
one that is alright but not so good; and one wrong answer.*

Put a tick to show the good answer.

Put a '?' to show the answer that is alright, but not best.

Put a cross to show the wrong answer.

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Part 2: *Fill in the gaps to show which paragraphs you chose:*

Paragraph _____ is the right paragraph

Paragraph _____ has one mistake in it

Paragraph _____ has two mistakes in it

Paragraph _____ has three mistakes in it

Paragraph _____ has four mistakes in it

Part 3:

1. _____
2. _____
3. _____
4. _____
5. _____

Red Test Answer Sheet: 'Safety and Comfort in the Air'

NAME: _____ BOY/GIRL: _____

AGE: _____ GROUP1/GROUP 2: _____

Part 1:

In each of these questions there is one good answer; one that is alright but not so good; and one wrong answer.

Put a tick to show the good answer.

Put a '?' to show the answer that is alright, but not best.

Put a cross to show the wrong answer.

1.

a	
b	
c	

4.

a	
b	
c	

7.

a	
b	
c	

10.

a	
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13.

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a	
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c	

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a	
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c	

11.

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a	
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a	
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12.

a	
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15.

a	
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c	

Part 2: Fill in the gaps to show which paragraphs you chose:

Paragraph _____ is the right paragraph

Paragraph _____ has one mistake in it

Paragraph _____ has two mistakes in it

Paragraph _____ has three mistakes in it

Paragraph _____ has four mistakes in it

Part 3:

1. _____
2. _____
3. _____
4. _____
5. _____

APPENDIX FIVE.

**Experimental material from
Study Five.**

Early Boats

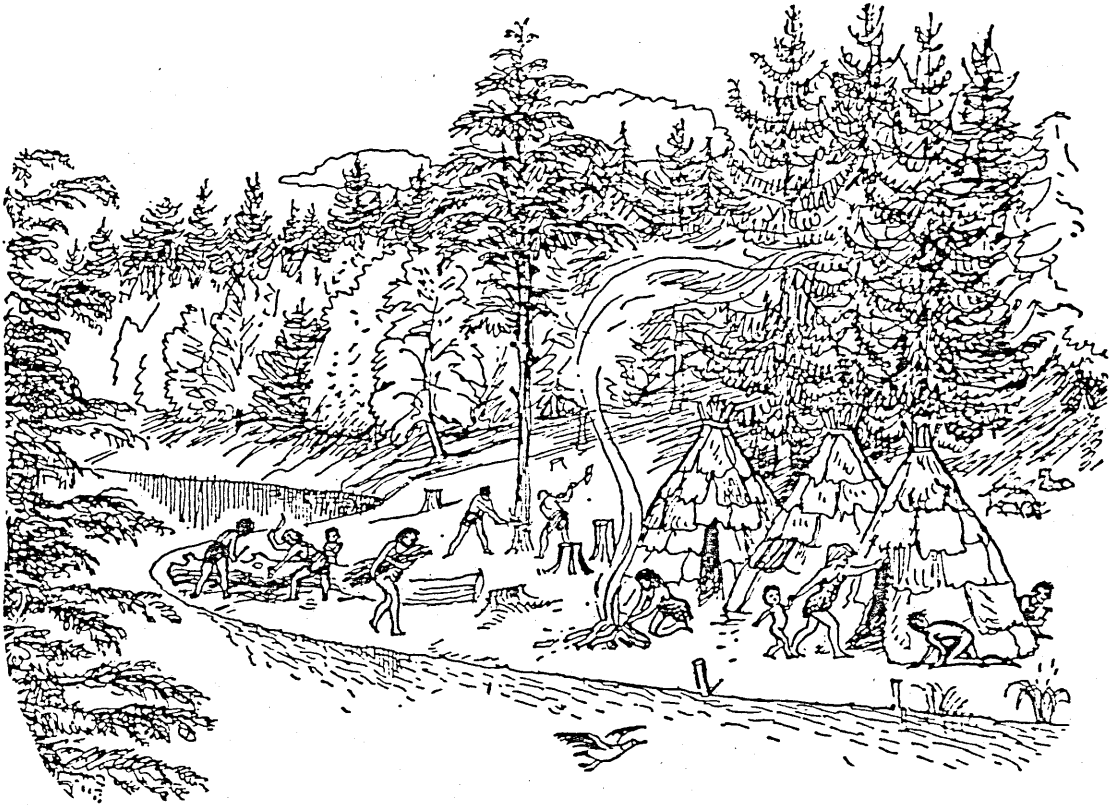
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But it was not always so. In the past, important changes and discoveries came when ordinary people wanted to find better ways of doing things.

It is not difficult to imagine the kind of people who had these ideas, and why they had them. Think about canoes: canoes used to be just a dug-out tree trunk; then someone thought of making a frame instead, and covering it with skins or bark. Of course, we do not know just how and when such discoveries were made. Probably the ideas grew slowly, in many different places. But we can use our imaginations..... Let your mind slip back through time..... back, and back, through the centuries.....

until you arrive far back in olden times.....

The tribe's camp stood a little back from the river, close to the forest edge. The river glinted in the morning sunlight, as it flowed down towards the sea. Some patches of grass showed through the melting snow. It was warm for early



spring. This was a country of lakes, rivers and forests. Throughout winter, it was gripped by snow and ice, and no man could go hunting or fishing. Now, in spring, everyone was getting ready for new hunting and fishing season. In summer, the tribe must find enough food to last through winter. Without good summer fishing, they would starve in winter. Women and children mended hooks and nets for the fishermen, and sharpened weapons for the huntsmen. The men worked on their canoes. These were used for fishing. They were heavy boats, made by choosing the right tree, and

felling it. Then the chosen log would be dragged down to the water's edge, and the job of digging out the inside would



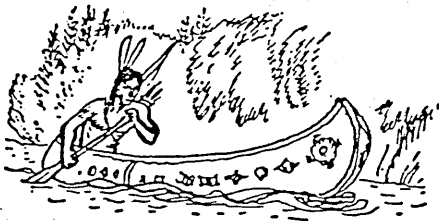
begin, using sharp axes. The tribe had always used these dugouts. They were strong and easy to make, but very heavy. It took six or seven men to drag them down to the water. Once waterlogged, they were too heavy to lift.

The Chieftain worked with the others. His name was Nighthawk. He looked like any of the other men as he worked on his new canoe. His strong, bare shoulders glistened with sweat as he swung his axe. His rough shirt lay on the ground beside him. His black, straight hair hung down around his shoulders, and only his colourful headband marked him as Chieftain. Although strong and well built, he was still a very young man, only nineteen summers old. He had become chief after his old father died a few weeks ~~later~~. EARLIER

Nighthawk was a worried man. There were fewer fish than ever before in the river and the nearby lakes. Old men in the tribe spoke of the Great Hunger at the time of their grandfathers. Then, many had died of cold and hunger. Without a good catch, the tribe went hungry in winter, and last summer the fishing had been bad. Now they were saying that the Great Hunger would return. They were saying that their new chief had brought bad luck. Nighthawk knew that the fish were fat and plentiful in the great lakes among the mountains. But these lakes were far inland. There were no forests near them where a man might find wood for a dugout, and the tribe's dugouts could not be carried far. They were

too heavy. How could these rich lakes be fished ?

He stared at the rushing river. Somehow, they needed a different kind of boat. Something big enough to fish from, but light enough to carry. Something that they could carry overland, to the lakes that were still full of fish. Then indeed he would be remembered as a great chief. He laughed bitterly to himself. He might as well wish for the sky. His mind went round and round in useless circles. He must think of something. He stared around at his people. They trusted him. Nighthawk sighed heavily, and gazed again at the river. It was in flood with melting snow, and full of wreckage, broken branches, and drowned animals. The river could be both peaceful friend and savage enemy. As he watched, a broken fisherman's basket bobbed by on the flood. They were strong baskets, made from a frame of wood, and covered by birch bark sewn onto the frame. He thought of trying to reach it, but pushed the thought aside. He must stop dreaming. The tribe looked to him for help. He watched the basket bob away round the corner, riding high and dry on the rushing water. He stiffened with sudden interest. Was such a thing possible ? If a basket made of wood strips and bark



could float in such waters, why not something bigger ? Why not build a canoe like a basket ? They could make a light, strong frame of wood strips, and cover it in bark.

Then they would have canoes large enough to fish from, but light enough to carry to the new lakes. Suddenly excited, he called to his men, and explained his idea.

His idea had worked. Nighthawk had replaced the old and heavy dugout with a fast, light, covered canoe. He had saved his tribe. Now they could reach the lakes where there were fish.

That year, the fishing season started in a new way. The old fishing grounds downriver were not visited at all. Instead, the men paddled away upriver in new boats. When they could paddle no further, they lifted their boats ashore. They carried them inland for two days, and made a summer camp by the great inland lakes. Then they started fishing from their new canoes. No-one had fished these waters before. The fishing was good.



The next winter, Nighthawk's first winter as Chieftain, was bitterly cold, but there was no Great Hunger. His tribe ate well through the long months of ice and snow. At the great feast of mid winter, they sat round fires of blazing logs eating, drinking, and telling stories of the great heroes of the past. Now, in the winters, there was no Great Hunger anymore. They thanked the gods for their good fishing. The old men doubted their new young chief no longer. Nighthawk smiled quietly in the smoky firelight. Perhaps the broken basket, drifting by on the flooded river last spring, had been sent to him by the gods, telling him how to save his people.

From Rollers To Wheels

Travel has always been a challenge - nowadays, we spend millions of pounds and dollars on ways of travelling through space, on new and faster trains, or new and better cars, ships or lorries. Men have always looked for better ways to travel, and better ways to transport things from one place to another. It has always been an exciting challenge, and probably it always will stir people's minds, and excite them. Today, most new ideas probably come from research laboratories; specially trained teams of scientists and researchers spend their lives studying new ways of travel and transport.

But it was not always so. In the past, important changes and discoveries came when ordinary people wanted to find better ways of doing things.

It is not difficult to imagine the kind of people who had these ideas, and why they had them. Think about wheels: people used to move heavy things by dragging them along using logs as rollers underneath. Then someone thought of fixing the rollers into place, so that they could turn round where they were: that was the first wheel on an axle. Of course, we do not know just how and when such discoveries

were made. Probably the ideas grew slowly, in many different places. But we can use our imaginations..... Let your mind slip back through time..... back, and back, through the centuries..... until you arrive far back in olden times.....



It was a blazing hot day. To the east, the sand stretched away into the distance. To the west was the half built palace. Although it was very hot, there was much activity. The palace must be finished by mid- summer. At midsummer, the new God King was to be crowned. His palace must be ready, and it must be something greater than men had ever seen before. Craftsmen and builders had been gathered from all corners of the known world. Merchants and sailors had brought rare woods, rugs, jewels and furnishings from far lands. Stone for the building had been quarried from the mountains in the south. It was lovely stone, shining and

smooth, fit indeed for the palace of a god king. Hundreds of slaves were hauling the stones into place. Although the blocks were not big, fifteen slaves were needed for each one. Each block lay on a wooden platform, and the platform

rested on logs.

These were the

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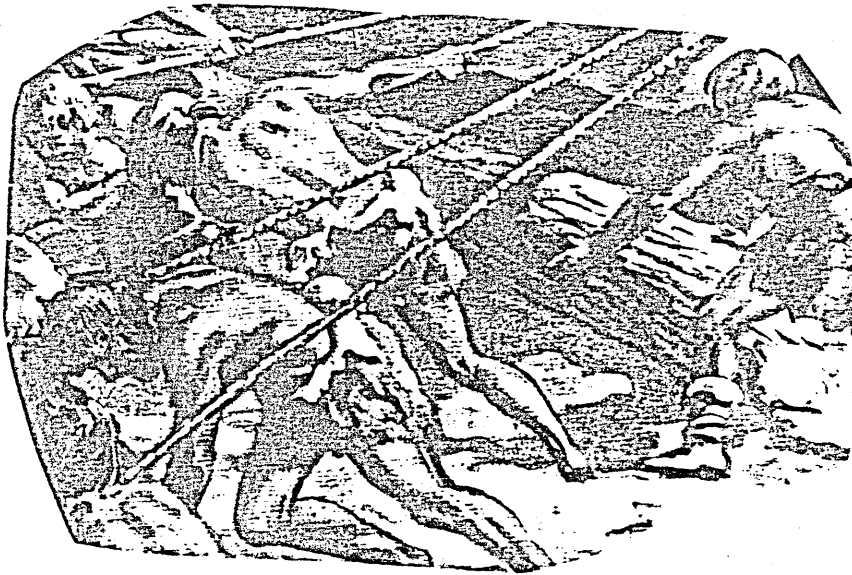
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slave lifted it, and carried it round to the front, ready for the moving stones again.

Mosa stood watching the work. He was a tall man. His long black hair was tied back with a red cloth, and he wore a short white tunic. On his fingers were gold rings, and round his neck was a gold chain. He was young for the important position he held. Already, at twenty three, he was one of the most important men on the site. He was a master builder, in charge of all the stone moving. His personal slave stood beside him, holding the plans and equipment he would need that day.

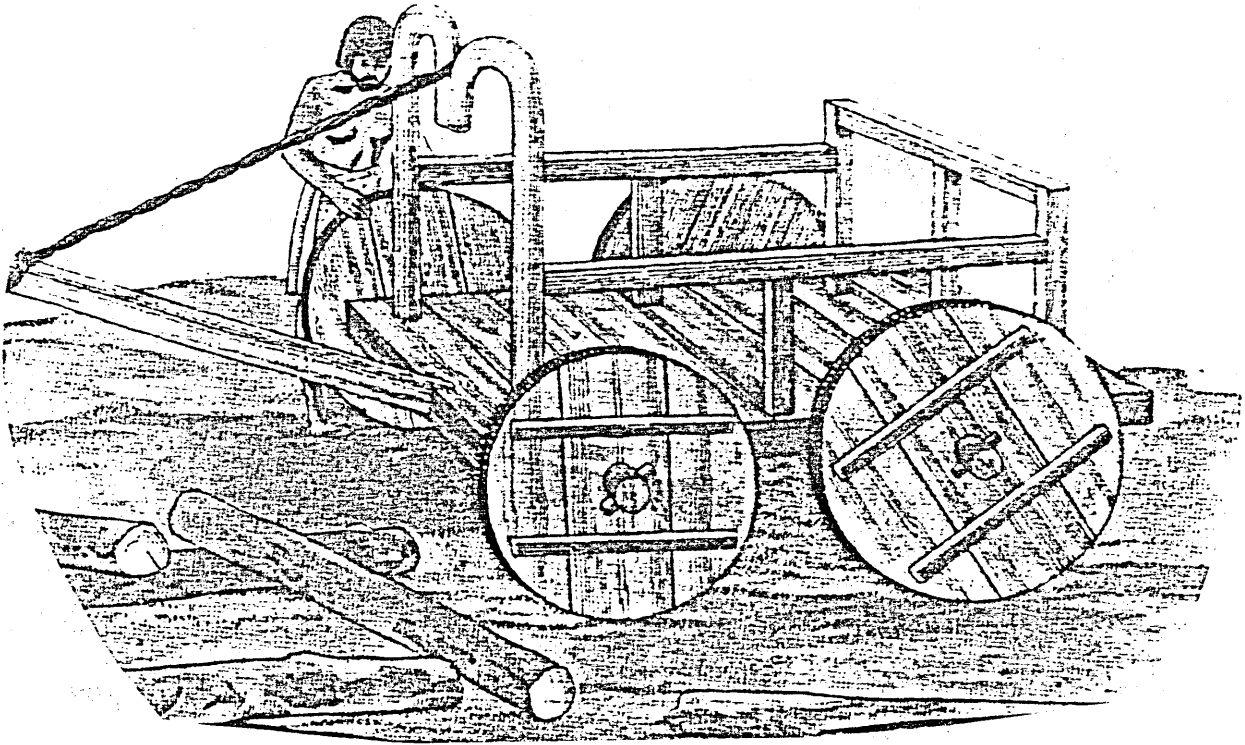
But Mosa was desperately worried. Although he had hundreds of slaves, it was not enough. It was many weeks



until midsummer, but there was much stone still to be moved from the quarries. Unless he could find some way to speed up the work, the palace would not be finished in time. There were no more slaves, and even if he had twice as many, it would not be enough. It would be his fault. Mosa knew what would happen then. He would have to pay the price, and the price would be his life. He would be sacrificed to the God King. He would be laid upon a stone altar, and a priest's knife would slide slowly under his ribs to find his heart. He shivered, despite the hot sun. He must find a way.

He stared at the sweating slaves as they heaved and pulled, but his eyes were unseeing. Somehow those stones must be moved faster. Using logs as rollers was slow. It took so long to move the rollers to the front, and position them right. But it was the only way. His long fingers twisted nervously at the rings on his fingers, absently turning them round and round as his mind searched endlessly. Suddenly, he froze into stillness. His fingers stopped. He stared down at his hands. Then slowly he began to twist his ring again. Was it possible ? He stared around, then snapped his fingers urgently. His slave handed him his measuring rod. Quickly, Mosa slipped two rings off his finger, and slid them over the rod, one at each end. Then he knelt down, and laid the rod on a piece of flat stone. Leaning down on the rod a little, he rolled it forwards, holding it tight between his fingers. The rings at each end rolled round and round, letting the rod move forward easily. With mounting excitement, Mosa leaned harder on the rod. Still the rings at each end rolled round easily as he pushed the rod forwards. Perhaps this was a way ? With rods fixed under a platform, he could put great rings of wood at both ends of

each rod. Then the platforms might move more quickly. Much more quickly. It was worth a try. He had nothing to lose by trying. He shouted to his slave, then strode away towards where the woodworkers and joiners worked. He would try out his idea this very day.



Two weeks later, Mosa again stood watching the slaves hauling the stones. No longer was he worried and anxious. His idea had worked. Each platform had rods fixed beneath it; at the ends of each rod a great ring of wood rolled round and round. The stones rolled past on their wheeled platforms more quickly and easily than before. Mosa had developed something very like our wheels and axles of today.

It was midsummer. The finished palace was indeed a fine sight. Block upon block of smooth and polished stone, it rose high above the crowds gathered for the coronation. Mosa watched the priests place the great gold crown upon the

fair head of the slim young man they called their God King. He smiled to himself, and remembered with a shudder of fear how close it had been. But for his great idea, the crowd would not be watching a coronation. Instead, they would be watching his blood, the blood of Mosa, master builder, running down the edges of the altar stone in a sticky river of red.

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But a few months earlier Mosa had been desperately worried. Although he had hundreds of slaves, it was not enough. It was many weeks until midsummer, but there was much stone still to be moved from the quarries. Unless he could find some way to speed up the work, the palace would not be finished in time. There were no more slaves, and even if he had twice as many, it would not be enough. It would be his fault. Mosa knew what would happen then. He would have to pay the price, and the price would be his life. He would be sacrificed to the God King. He would be laid upon a stone altar, and a priest's knife would slide slowly under his ribs to find his heart. He shivered, despite the hot sun. He had to find a way.

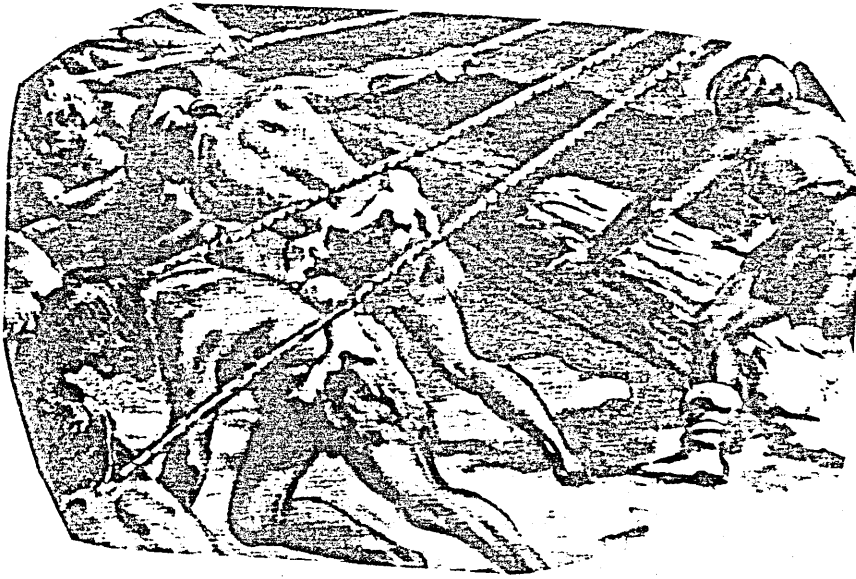
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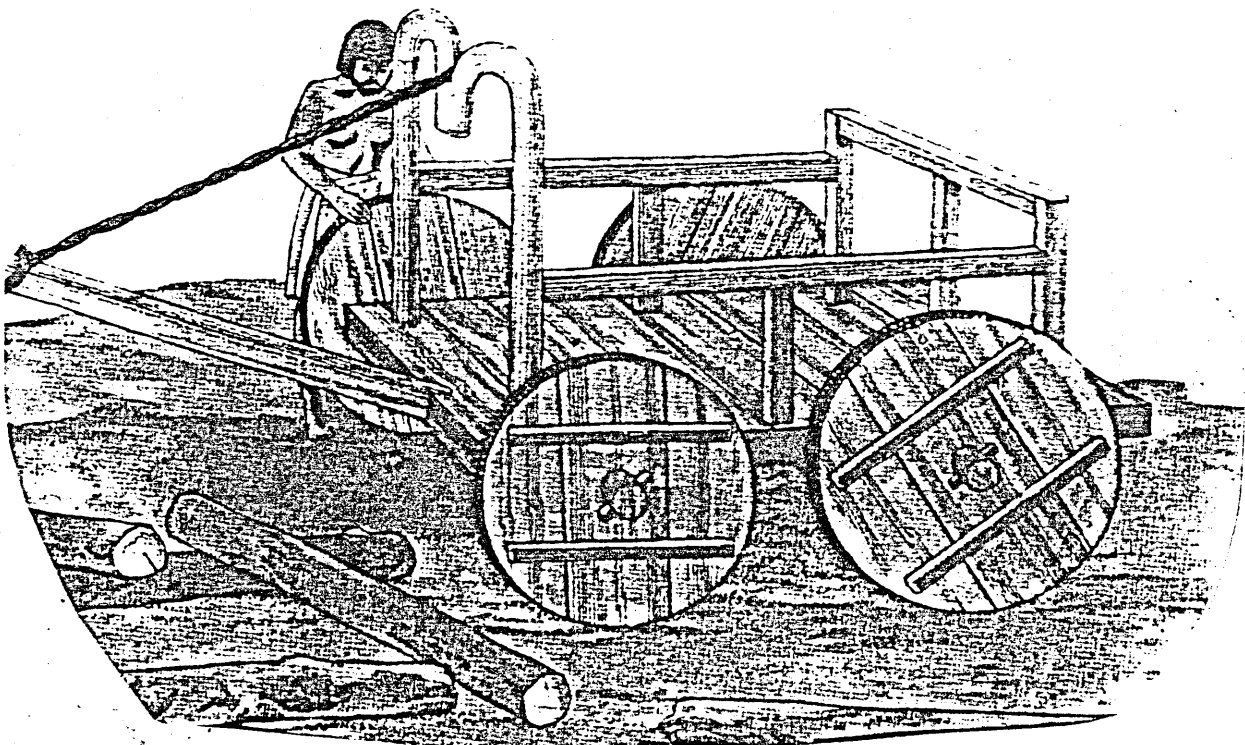
These were the rollers. Ten slaves hauled on ropes from the front, rolling the stone slowly forwards on its platform. The other slaves moved the rollers. As each one rolled free

at the back, a slave lifted it, and carried it round to the front, ready for the moving stone again.

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Early Boats

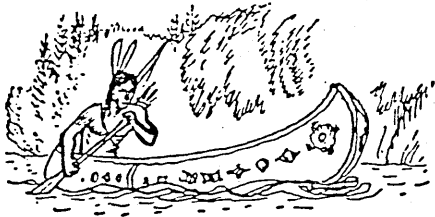
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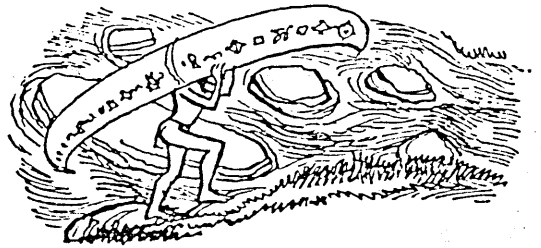
Nighthawk's first full winter as Chieftain was bitterly cold, but there was no Great Hunger. His tribe ate well through the long months of ice and snow. At the great feast of mid winter, they sat round fires of blazing logs eating, drinking , and telling stories of the great heroes of the past. They thanked the gods for their good fishing. The old men doubted their new young chief no longer. Nighthawk smiled quietly in the smoky firelight. Perhaps the broken basket, drifting by on the flooded river last spring, had been sent to him by the gods, telling him how to save his people.



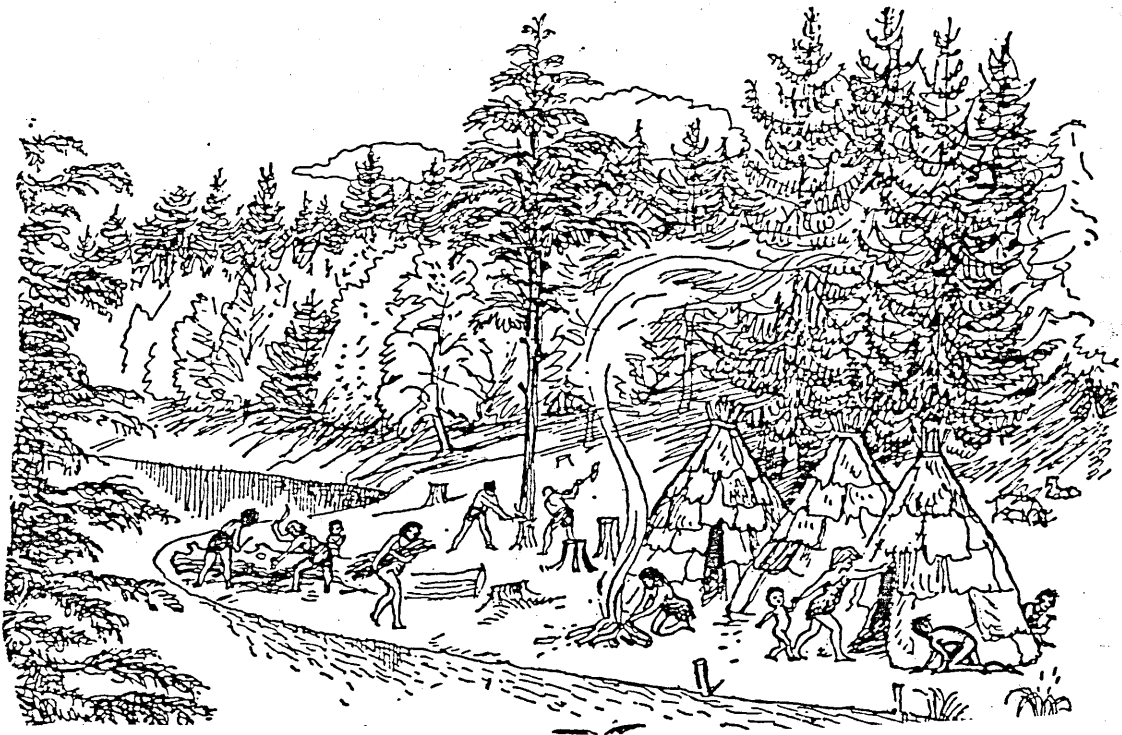
That year, Nighthawks first full season as chieftain, the fishing season had started in a new way. The old fishing grounds downriver had not been visited at all. Instead,

the men paddled away upriver in new boats. When they could paddle no further, they lifted their boats ashore.

They carried them inland for two days, and made a summer camp by the great inland lakes. Then they started fishing from their new canoes. No-one had fished these waters before. The fishing was good.



Before that, in the early spring, Nighthawk had been a worried man. There were fewer fish than ever before in the river and the nearby lakes. Old men in the tribe spoke of the Great Hunger at the time of their grandfathers. Then, many had died of cold and hunger. Without a good catch, the tribe went hungry in winter, and last summer the fishing had been bad. They were saying that the Great Hunger would return. They were saying that their new chief had brought bad luck. Nighthawk knew that the fish were fat and plentiful in the great lakes among the mountains. But these lakes were far inland. There were no forests near them where a man might find wood for a dugout, and the tribe's dugouts could not be carried far. They were too heavy. How could these rich lakes be fished ?



It had been warm for early spring. The tribe's camp stood a little back from the river, close to the forest edge. The river glinted in the morning sunlight, as it flowed down towards the sea. Some patches of grass showed through the melting snow. This was a country of lakes,

rivers and forests. Throughout winter, it was gripped by snow and ice, and no man could go hunting or fishing. In summer, the tribe had to find enough food to last through winter. Without good summer fishing, they would starve in winter. Now, in spring, everyone was getting ready for new hunting and fishing season.

The new chieftain, Nighthawk, worked with the others. He looked like any of the other men as he worked on his new canoe. His strong, bare shoulders glistened with sweat as he swung his axe. His rough shirt lay on the ground beside him. His black, straight hair hung down around his shoulders, and only his colourful headband marked him as Chieftain. Although strong and well built, he was still a very young man, only nineteen summers old. He had become chief after his old father died a few weeks earlier.

Women and children mended hooks and nets for the fishermen, and sharpened weapons for the huntsmen. The men worked on their canoes. These were used for fishing. They were heavy boats, made by choosing the right tree, and



felling it. Then the chosen log would be dragged down to the water's edge, and the job of digging out the inside would begin, using sharp axes. The tribe had always used these dugouts. They were

strong and easy to make, but very heavy. It took six or seven men to drag them down to the water. Once waterlogged, they were too heavy to lift.

The idea for a new kind of boat had come suddenly to Nighthawk. He had been staring at the rushing river,

thinking desperately. Somehow, they needed a different kind of boat. Something big enough to fish from, but light enough to carry. Something that they could carry overland, to the lakes that were still full of fish. Then indeed he would be remembered as a great chief. He laughed bitterly to himself. He might as well wish for the sky. His mind went round and round in useless circles. He had to think of something. He stared around at his people. They trusted him. Nighthawk sighed heavily, and gazed again at the river. It was in flood with melting snow, and full of wreckage, broken branches, and drowned animals. The river could be both peaceful friend and savage enemy. Then, as he watched, a broken fisherman's basket had bobbed by on the flood. They were strong baskets, made from a frame of wood, and covered by birch bark sewn onto the frame. He thought of trying to reach it, but pushed the thought aside. He must stop dreaming. The tribe looked to him for help. He watched the basket bob away round the corner, riding high and dry on the rushing water. Then he stiffened with sudden interest. Was such a thing possible ? If a basket made of wood strips and bark could float in such waters, why not something bigger ? Why not build a canoe like a basket ? They could make a light, strong frame of wood strips, and cover it in bark. Then they would have canoes large enough to fish from, but light enough to carry to the new lakes. Suddenly excited, he had called to his men, and explained his idea.

His idea had worked. Nighthawk had replaced the old and heavy dugout with a fast, light, covered canoe. He had saved his tribe. Now they could reach the lakes where there were fish. Now, in the winters, there was no Great Hunger any more.

Red Test: 'From Rollers to Wheels'

Part A: Some of the following statements are True (T), some are False (F), and for some there is Not Enough Evidence (NEE) to say whether they are true or false. Tick the box on the answer sheet to show which each statement is.

1. Sailors had brought the stones from far lands.
2. The stones had been brought from the south.
3. The stone was a deep yellow colour.
4. Slaves working on the stone were specially chosen for their great strength.
5. The stone blocks were huge.
6. The stone blocks were not big.
7. Fifteen slaves were needed for each stone.
8. Fifty slaves were needed for each stone.
9. Mosa was a Master Builder.
10. Mosa was a good master, and cared for his slaves.
11. Mosa was in charge of the woodworkers and joiners.
12. Mosa was twenty three.
13. His birthday was soon after mid summer.
14. Mosa had learned his trade from his father.
15. He was fair haired, and tied his hair with a red cloth.
16. He wore no jewellery except two plain bronze rings on his fingers.
17. Mosa was a tall man in a white tunic.
18. Like the slaves, he was barefoot.
19. Mosa had his personal slave to hold his equipment.
20. His personal slave had been with him for many years.
21. Mosa was alone when he had his idea.
22. He was well known for his strange ideas, but this was his best yet.
23. Mosa used a rod and rings to test his idea.
24. It took many months to put the new ideas into practice.

25. He got the idea from one of the merchants.
26. It took two weeks to put the new ideas into practice.
27. Mosa had difficulty getting the woodworkers to help.
28. The rods with wheels were fixed to the wooden platforms.
29. The rods with wheels were fixed directly to the stones.
30. The first the rods broke, so they had to use thicker ones.

Part B:

1. The new palace had to be finished in time because
 - (a) craftsmen had been gathered from all over the world
 - (b) the god king was to be crowned
 - (c) it became very hot at midsummer
 - (d) there was to be a midsummer human sacrifice
2. The stone moving was going too slowly because
 - (a) the stone blocks were so big
 - (b) the weather was so hot
 - (c) there were not enough slaves
 - (d) using rollers to move them was not fast enough
3. Mosa was worried because
 - (a) there was a shortage of stone
 - (b) he was very young for such an important job
 - (c) he thought the work would not be finished in time
 - (d) he needed twice as many slaves
4. Mosa would be sacrificed because
 - (a) there was always a human sacrifice at a coronation
 - (b) he would be blamed if there was a delay
 - (c) he had changed the old way of moving stones
 - (d) he had used too many slaves
5. Mosa strode away to see the joiners and woodworkers because
 - (a) he wanted to try out his idea
 - (b) he hoped they would have a new idea to help him
 - (c) he needed their slaves to help with the stone-moving
 - (d) they were slowing down the stone-moving

Part C

There are 10 gaps in this passage. For each gap, there is a choice of words to put in. Two or three might fit quite well, but one will be best. Choose the best one.)

The young Master ____1____ was worried. As he stood in the hot and sandy desert looking at the ____2____ completed palace, Mosa realised that he needed many more slaves. The palace would not be finished in time if he had to go on using fifteen slaves to drag each stone block along on ____3____. If the place was not finished, Mosa would have been ____4____, because he was the master builder. The ____5____ standing beside him was carrying a rod used for measuring. The idea of wooden wheels on axles came from his ____6____ and the measuring rod. The stones would be ____7____, so Mosa pressed down hard on the rod and rings, to see if they still rolled smoothly. They did. The ____8____ experimented with Mosa's idea, and found that it worked. Fixing rings of wood to rods beneath the platforms was a ____9____ way of moving a heavy weight than using log rollers. The stones from the mountains in the south were moved much more easily on the ____10____ wheeled platforms, and because of this, the palace was finished in time.

CHOICES:

1. craftsman, builder, slave-driver, joiner
2. half, newly, nearly, beautifully
3. blocks, wheels, platforms, rollers
4. sacrificed, disappointed, upset, disgraced
5. slave, builder, assistant, joiner
6. plans, fingers, rings, neck-chain
7. heavy, clumsy, slow-moving, large
8. slaves, woodworkers, builders, stonemasons
9. slower, safer, quicker, clumsier
10. huge, old, small, new

Blue Test: 'Early Boats'

Part A: Some of the following statements are True (T), some are False (F), and for some there is Not Enough Evidence (NEE) to say whether they are true or false. Tick the box on the answer sheet to show which each statement is.

1. The tribe's camp was close to the inland lakes.
2. The tribe's camp was near a river.
3. They made fishing nets from deer-hide thongs.
4. Dugout canoes were hollowed out at the river edge.
5. Very old trees were best for dugouts.
6. They dug out their canoes in the forest.
7. Animal skins were used to cover the new canoes.
8. Dugouts were strong and easy to make.
9. Many canoes had beautifully carved figureheads.
10. Dugouts were light and easy to carry.
11. Nighthawk was nineteen years old.
12. As Chieftain, he wore a bearskin cloak.
13. He had lost two fingers in a hunting accident.
14. Nighthawk was twenty nine years old.
15. He wore a coloured headband to show he was chief.
16. Nighthawk's mother had died when he was a baby.
17. The tribe were worried about the fishing.
18. Seventeen people had died in the last Great Hunger.
19. Salmon was the most common fish in those rivers.
20. There were plenty of fish in their usual fishing grounds.
21. Although the tribe was sometimes a little short of food, there had never been serious hunger.
22. They remembered the starvation in the last Great Hunger.
23. Nighthawk got his idea from a piece of floating wreckage.
24. Nighthawk's father had given him the idea about canoes.
25. Animal skins were used to cover the new canoes.

26. Birch tree bark was the best for covering the baskets.
27. The new canoes were made of wood strips covered with bark.
28. The new canoes were big enough to carry four men.
29. The tribe had no food problems in the following winters.
30. As well as good fishing in the summer, the tribe had had good hunting.

Part B:

1. The tribe must catch plenty of fish each summer because
 - (a) the fish went away each autumn
 - (b) the winters were too cold for fishing
 - (c) the tribe moved inland, away from the water for the winter
 - (d) they liked to eat fish in summer and other things in winter.
2. Nighthawk became Chieftain so young because
 - (a) his father died
 - (b) the tribe trusted him to save them
 - (c) the old men were afraid of another Great Hunger
 - (d) he thought of a new way of making canoes.
3. The tribe could not fish the inland lakes because
 - (a) there were very ^{Few} fish in them
 - (b) their dugout canoes were too heavy
 - (c) they were frozen over all through the year
 - (d) the river was in flood, and dangerous for travel
4. They could not make dugouts at the inland lakes because
 - (a) they had no suitable tools
 - (b) the lakes were too far away
 - (c) all the tribe were getting ready for the new hunting and fishing season
 - (d) there were no suitable woods near the lakes.
5. Their new canoes were much better because
 - (a) they were larger
 - (b) they were easier to make
 - (c) they were lighter
 - (d) they were faster.

Part C

There are 10 gaps in this passage. For each gap, there is a choice of words to put in. Two or three might fit quite well, but one will be best. Choose the best one.)

The camp was by the river in the forest, and the ___1___ with fish were far away. The tribe could not reach them in their boats. Nighthawk felt ___2___ as he watched the river swirl by; the old men were saying that another Great Hunger would come. Somehow they had to find a way to reach the ___3___ lakes. The young chief was working on his ___4___ when he saw the piece of wreckage, bobbing on the flooded river. It was a broken ___5___, and it gave Nighthawk an idea about how to reach the inland lakes. They could make a new kind of canoe, ___6___ enough to be carried. It could be made in the same way as the ___7___ made their baskets. The idea worked perfectly. The dugouts were too heavy to lift when ___8___, but the new canoes could be carried. The tribe reached the mountain lakes. These lakes had never been fished before, and the fishing season was good. The old men accepted Nighthawk as their ___9___ now, although he was only nineteen years old. Nighthawk thanked the gods for what he had seen that ___10___ morning by the river.

CHOICES:

1. rivers, lakes, forests, seas
2. pleased, furious, relieved, helpless
3. coastal, inland, southern, down-river
4. dugout, fishing-basket, weapons, nets
5. boat, canoe, tree-trunk, basket
6. long, strong, heavy, light
7. tribe, Indians, fishermen, hunters
8. wet, finished, carried, fishing
9. god, fisherman, hunter, chief
10. winter, spring, lazy, cold.

Red Test Answer Sheet: 'From Rollers to Wheels'

NAME: _____

BOY/GIRL: _____

AGE: _____

GROUP 1/ GROUP 2: _____

Part A: Tick the box to show whether each statement is True (T), False (F), or whether there is Not Enough Evidence (NEE) to decide.

	T	F	NEE
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

	T	F	NEE
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

	T	F	NEE
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			
30.			

Part B: Tick the box to show the right ending for each sentence.

1.

a	
b	
c	
d	

2.

a	
b	
c	
d	

3.

a	
b	
c	
d	

4.

a	
b	
c	
d	

5.

a	
b	
c	
d	

Part C: Write in the word you chose.

1. _____
2. _____
3. _____
4. _____
5. _____

6. _____
7. _____
8. _____
9. _____
10. _____

Blue Test Answer Sheet: 'Early Boats'

NAME: _____

BOY/GIRL: _____

AGE: _____

GROUP 1/ GROUP 2: _____

Part A: Tick the box to show whether each statement is True (T), False (F), or whether there is Not Enough Evidence (NEE) to decide.

	T	F	NEE
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

	T	F	NEE
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

	T	F	NEE
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			
30.			

Part B: Tick the box to show the right ending for each sentence.

1.

a	
b	
c	
d	

2.

a	
b	
c	
d	

3.

a	
b	
c	
d	

4.

a	
b	
c	
d	

5.

a	
b	
c	
d	

Part C: Write in the word you chose.

1. _____
2. _____
3. _____
4. _____
5. _____

6. _____
7. _____
8. _____
9. _____
10. _____

APPENDIX SIX.

**Experimental material from
Study Six.**

The Miners of Yukvak Island - Daily Life in the Frozen North

For most of the year, Yukvak Island is covered in snow. The wind comes screaming in off the Arctic Ocean, tearing at bare grey mountains and empty beaches. Gold was first discovered among the grim mountains in 1893. Until that time, nothing had lived there except fish, and the seals and seabirds who hunted them. Then men came by the thousands, greedy for (the rare metal / gold). By 1902, the last gold had been dug out, and men left, leaving the island again to the seals, the fish, and the seabirds .

But life in this cold and wild world had not been easy. The (workplace itself / mines themselves) took the lives of many men, mostly through rockfalls. Heating was a difficulty. Men spent hours searching the beaches for (fuel / wood) for their fires. Most of the miners lived under canvas, and their frail (shelters / tents) offered little protection against the worst of the winter. Some of those who had been there a long time had managed simple (buildings / cabins) of stones and driftwood. They took great care of these rough homes, with family photographs as (decorations / pictures) on the walls. Though some men slept in hammocks, others found that driftwood could be used for making quite comfortable (furniture / beds). But however many (coverings / blankets) they piled over themselves at night, often the cold would keep men awake.

Fresh water was difficult, and each (container / bucket) had to be carried from the well, across thick mud or frozen snow. A man's (footwear / boots) needed to be of the best leather, and well greased, to keep out the wet and cold. One man would stay in camp, and his job was to have (food / dinner) ready for his mates when they returned from the mines in the evenings. Before the long day's work, a good (meal / breakfast) was needed, and the camp cook would get up before the others to get it ready. (Cooking equipment was / pots and pans were) rough and home-made, using old tins to boil up the porridge and coffee. Each man, too, needed something to take with him to

(his work / the mines), for his lunch, and the cook had to get this ready.

There was not much to do during the long evenings. (Transport / a boat) crossed the stormy seas every month from the mainland, bringing stores and equipment. It was not an easy journey, and often during the winter they had to turn back, stopped by the (weather / storms). There was no harbour, only a sheltered bay on the south of the island, where there might be some protection from the wild (waters / sea). (Reading matter / newspapers) came with the monthly stores, and the lonely men could read about what was happening in the world beyond their grim island. Some men took the chance offered by the monthly stores run to write long (messages / letters) to their families at home. Fiddle music was popular, and the few men who had them took great care of their precious (instruments / fiddles). Some men had good voices, and the men in a camp thought themselves lucky if they had a good (performer / singer) among them. Some men were good shots, and spent summer evenings with their (weapons / guns) near the cliffs where the seabirds nested. Though the (creatures / birds) had a fishy flavour, they made a change to the daily food in the camp. Others enjoyed seafoods, and went down to the shore with their rods to catch what (food/ fish) they might from the cold sea. Often, though, men were too tired after their long day (working / digging) with their picks and shovels to want anything except food and bed.

Not many stayed on Yukvak Island for long. It needed a strong man indeed to last longer than a year or two in such hard conditions.

The Treasure Beneath the Snow - Mining for Gold on Yukvak Island

Digging for gold on Yukvak Island needed great strength and courage. So close to the North Pole, it was a hard place for the men who worked there. Mining has always been a hard, dirty and dangerous job. But for the miners of the Yukvak gold rush, from 1893 to 1902, conditions were specially terrible. The bitter (weather conditions/ cold) added to the grimness of working deep in the frozen rock of the Arctic islands. Many did not survive the harsh and lonely life.

The mines cost thousands of lives over the years, and men became used to hearing the (noise/ crash) of falling rock as they worked underground. The sight of a broken body, roughly hidden from view by a (covering/ sheet) pulled over it, was quite common. Later, the body would be (moved/ carried) to the surface on a rough stretcher made of planks. The badly injured had little hope, because the nearest (help/ doctor) was hundreds of miles away on the mainland. No-one wanted to share their tent with a corpse, and the dead were (got rid of/ buried) as soon as possible. Men left work early, taking with them (tools/ picks and shovels) from the mine to the graveyard, to do what had to be done. But because of the frozen soil, the gravediggers could sometimes manage only a shallow (hole/ grave).

To get at the precious metal buried deep in the frozen rock, big lumps of rock were (removed/ blasted out) with dynamite. These had to be shifted away, and (animals/ ponies) were used to pull carts of rock to the bottom of the main shaft. Here it was hauled to the surface in a basket on the end of a long (line/ rope). When they reached the surface, these lumps of rock were broken up into smaller pieces by pounding them with (handtools/ hammers and axes). The (material was/ rock fragments were) cleaned in running water, to clear away the rubbish. Only then could the ~~water~~ gold be picked out.

The working day underground was long and hard, starting in the early morning, and lasting many long hours. Before going

underground, each man took a lamp, and filled it with enough (fuel/ oil) to last him through the day. Then he began the long (journey/ climb) down the ladders of the mine shaft, from the frozen surface to the dark tunnels far beneath. In winter, the (sides/ shaft walls) were covered in a skin of gleaming ice. The men carried their food and tools in a sack (fixed/ tied) to their belts. That left both hands free to hold on to the icy (bars/ rungs) as they climbed down the endless dark shaft. When they reached the (end/ bottom), they still had a long way to go to the workface. All day they drilled and blasted and dug, (loading/ shovelling) the smashed rock into carts to be dragged away. They stopped only to (refresh themselves/ eat and drink), tearing hungrily at the food in the dim lamplight, as they crouched by the piles of rock. There was no water underground, so each man carried his own water bottle, and the (liquid/ water) in it had to last all day. Then at the end of the day they had the long (trip/ walk) back down the tunnel to the bottom of the shaft. For men tired from the long day's work, digging and shovelling far below the surface, the climb up to the (top/ shaft entrance) was very tiring. The ponies, though, never left the mine, and spent each night in (rooms / stables) carved out from the rock hundreds of feet below the surface.

For both men and horses it was a hard living. Some men, a few, made their fortunes, but most did not, and both men and animals learned to hate the icy darkness of Yukvak's gold mines.

The Miners of Yukvak Island — Daily Life in the Frozen North

For most of the year, Yukvak Island is covered in snow. The wind comes screaming in off the Arctic Ocean, tearing at bare grey mountains and empty beaches. Gold was first discovered among the grim mountains in 1893. Until that time, nothing had lived there except fish, and the seals and seabirds who hunted them. Then men came by the thousands, greedy for gold. By 1902, the last gold had been dug out, and men left, leaving the island again to the seals, the fish, and the seabirds.

But life in this cold and wild world had not been easy. The mines themselves took the lives of many men, mostly through rockfalls. Heating was a difficulty. Men spent hours searching the beaches for wood for their fires. Most of the miners lived under canvas, and their frail tents offered little protection

gainst the worst of the winter.

Some of those who had been there a long time had managed simple cabins of stones and driftwood.

They took great care of these rough homes, with family photographs as pictures on the walls. Though some men slept in hammocks, others found

that driftwood could be used for making quite comfortable beds. But however many blankets they piled over themselves at night, often the cold would keep men awake.

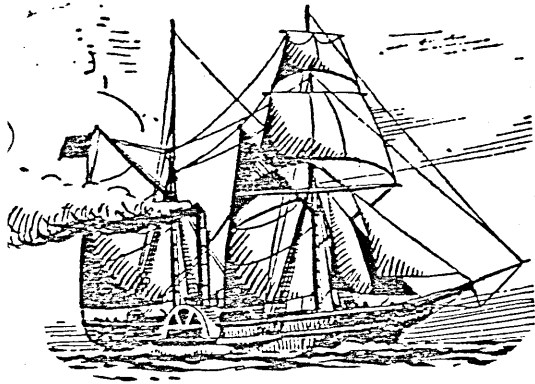


Fresh water was difficult, and each bucket had to be carried from the well, across thick mud or frozen snow. A man's boots needed to be of the best leather, and well greased, to keep out the wet and cold. One man would stay in camp, and his job was to have dinner ready for his mates when they returned from the mines in the evenings. Before the long day's work, a good breakfast was needed, and the camp cook would get up before the others to get it ready. Pots and pans were rough and home-made, using old tins to boil up the porridge and coffee. Each man, too, needed something to take with him to the mines, for his lunch, and the cook had to get this ready.

There was not much to do during the long evenings. A boat crossed the stormy seas every month from the mainland, bringing stores and equipment. It was not an easy journey, and often during the winter they had to turn back, stopped by the storms. There was no harbour, only a sheltered bay on the south of the island, where there might be some protection from the wild sea. Newspapers came with the monthly stores, and the lonely men could read about what was happening in the world beyond their grim island. Some men took the chance offered by the monthly stores run to write long letters to their families at home. Fiddle music was popular, and the few men who had them took great care of their precious fiddles. Some men had good voices, and the men in a camp thought themselves lucky if they



had a good singer among them. Some men were good shots, and spent summer evenings with their guns near the cliffs where the seabirds nested. Though the birds had a fishy flavour, they made a change to the daily food in the camp. Others enjoyed seafoods, and went down to the shore with their rods to catch what foodfish they might from the cold sea. Often, though, men were too tired after their long day digging with their picks and shovels to want anything except food and bed.



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The Treasure Beneath the Snow - Mining for Gold on Yukvak Island

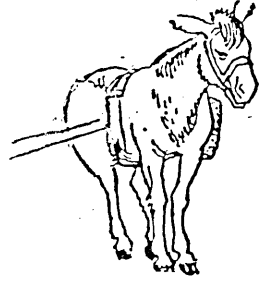
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To get at the precious metal buried deep in the frozen rock, big lumps of rock were blasted out with dynamite. These had to be shifted away, and ponies were used to pull carts of rock to the bottom of the main shaft. Here it was hauled to the surface in a basket on the end of a long rope. When they reached the surface, these lumps of rock were broken up into smaller pieces by pounding them with hammers and axes. The rock fragments were cleaned in running water, to clear away the rubbish. Only then could the gold be picked out.



The working day underground was long and hard, starting in the early morning, and lasting many long hours. Before going underground, each man took a lamp, and filled it with enough oil to last him through the day. Then he began the long climb down the ladders of the mine shaft, from the frozen surface to the dark tunnels far beneath. In winter, the shaft walls were covered in a skin of gleaming ice. The men carried their food and tools in a sack tied to their belts. That left both hands free to hold on to the icy rungs as they climbed down the endless dark shaft. When they reached the bottom, they still had a long way to go to the workface. All day they drilled and blasted and dug, shovelling the smashed rock into carts to be dragged away. They stopped only to eat and drink, tearing hungrily at the food in the dim lamplight, as they crouched by the piles of rock. There was no water underground, so each man carried his own water bottle, and the water in it had to last all day. Then at the end of the day they had the long walk back down the tunnel to the bottom of the shaft. For men tired from

the long day's work, digging and shovelling far below the surface, the climb up to the shaft entrance was very tiring.

The ponies, though, never left the mine, and spent each night in stables carved out from the rock hundreds of feet below the surface.



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protection against the worst of the winter. Some of those who had been there a long time had managed simple buildings of stones and driftwood. They took great care of these rough homes, with family photographs as decorations on the walls. Though some men slept in



hammocks, others found that driftwood could be used for making quite comfortable furniture. But however many coverings they

piled over themselves at night, often the cold would keep men awake.

Fresh water was difficult, and each container had to be carried from the well, across thick mud or frozen snow. A man's footwear needed to be of the best leather, and well greased, to keep out the wet and cold. One man would stay in camp, and his job was to have food ready for his mates when they returned from the mines in the evenings. Before the long day's work, a good meal was needed, and the camp cook would get up before the others to get it ready. Cooking equipment was rough and home-made, using old tins to boil up the porridge and coffee. Each man, too, needed something to take with him to his work, for his lunch, and the cook had to get this ready.

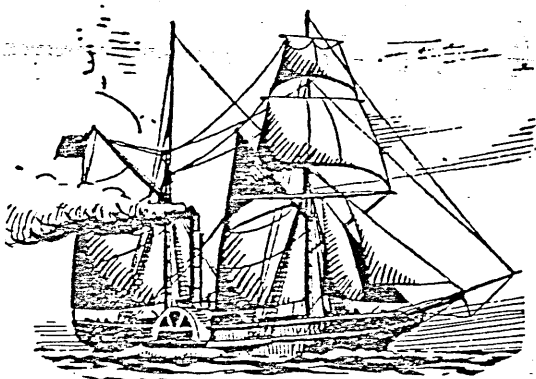
There was not much to do during the long evenings. Transport crossed the stormy seas every month from the mainland, bringing stores and equipment. It was not an easy journey, and often during the winter they had to turn back, stopped by the weather. There was no harbour, only a sheltered bay on the south of the island, where there might be some protection from the wild waters.

Reading matter came with the monthly stores, and the lonely men could read about what was happening in the world beyond their grim island. Some men took the chance offered by the



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Often, though, men were too tired after their long day working with their picks and shovels to want anything except food and bed.



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The Treasure Beneath the Snow - Mining for Gold on Yukvak Island

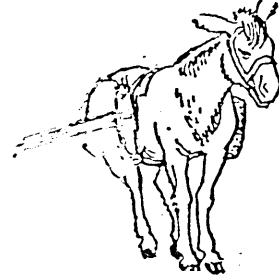
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The mines cost thousands of lives over the years, and men became used to hearing the noise of falling rock as they worked underground. The sight of a broken body,

roughly hidden from view by a covering pulled over it, was quite common. Later, the body would be moved to the surface on a rough stretcher made of planks. The badly injured had little hope, because the nearest help was hundreds of miles away on the mainland. No-one wanted to share their tent with a corpse, and the dead were got rid of as soon as possible. Men left work early, taking with them tools from the mine to the graveyard, to do what had to be done. But because of the frozen soil, the gravediggers could sometimes manage only a shallow hole.

To get at the precious metal buried deep in the frozen rock, big lumps of rock were removed with dynamite. These had to be shifted away, and animals were used to pull carts of rock to the bottom of the main shaft.



Here it was hauled to the surface in a basket on the end of a long line.

When they reached the surface, these lumps of rock were broken up into smaller pieces by pounding them with handtools. The material was cleaned in running water, to clear away the rubbish. Only then could the gold be picked out.

The working day underground was long and hard, starting in the early morning, and lasting many long hours. Before going underground, each man took a lamp, and filled it with enough fuel to last him through the day. Then he began the long journey down the ladders of the mine shaft, from the frozen surface to the dark tunnels far beneath. In winter, the sides were covered in a skin of gleaming ice. The men carried their food and tools in a sack fixed to their belts. That left both hands free to hold on to the icy bars as they climbed down the endless dark shaft. When they reached the end, they still had a long way to go to the workface. All day they drilled and blasted and dug, loading the smashed rock into carts to be dragged away. They stopped only to refresh themselves, tearing hungrily at the food in the dim lamplight, as they crouched by the piles of rock. There was no water underground, so each man carried his own water bottle, and the liquid in it had to last all day. Then at the end of the day they had the long trip back

down the tunnel to the bottom of the shaft. For men tired from the long day's work, digging and shovelling far below the

surface, the climb up to the top was very tiring. The ponies, though, never left the mine, and spent each night in rooms carved out from the rock hundreds of feet below the surface.



For both men and horses it was a hard living. Some men, a few, made their fortunes, but most did not, and both men and animals learned to hate the icy darkness of Yukvak's gold mines.

Test for

(Blue test)

**"The Treasure beneath the Snow
- Mining for Gold on Yukvak
Island"**

There are four choices in each question.

One explains exactly what the passage meant. Use two ticks on the answer sheet to show this one.

One explains what the passage meant, but is not quite so exact. Use one tick on the answer sheet to show that one.

The others might seem true, but it does not say so in the passage. Do not put anything by them.

EXAMPLE:

Yukvak Island was

- (a) a rather uncomfortable place to live (a)
- (b) a cold and lonely island near the Arctic (b)
- (c) the largest island in the area (c)
- (d) nearly 20 miles wide. (d)

(b) is exactly what the passage meant

(a) is what the passage meant, but not so exact

(c) and (d) might be true, but it does not say so in the passage. So the answer sheet should look like this:

(a)	✓
(b)	✓✓
(c)	
(d)	

QUESTIONS:

1. Working on Yukvak Island was made worse by
 - (a) the constant hunger and shortage of supplies
 - (b) the freezing cold underground
 - (c) the icy weather conditions at the mines
 - (d) the lack of proper food
2. The men working underground became used to
 - (a) the sudden noise caused by a cave in
 - (b) the unexpected crash of a roof fall
 - (c) the choking dust that filled the mines
 - (d) the difficulty of working in such dim light
3. Fatal accidents were common, and the body
 - (a) would quickly have a sheet spread over it
 - (b) was swiftly hidden from sight with a covering
 - (c) sometimes had to be left buried beneath the fallen rock
 - (d) could not always be found
4. When a body had been dug out
 - (a) it might be left underground until burial
 - (b) it was moved to the surface as soon as possible
 - (c) it was carried from the mine without delay
 - (d) it was stored in the mine, sometimes for several days

5. The badly injured did not often live, because
 - (a) conditions on the island were so bad
 - (b) the nearest help was far away
 - (c) of the intense cold and poor housing
 - (d) there was no doctor on the island
6. When there had been a death
 - (a) only the dead man's workmates were affected by it
 - (b) the whole camp would be affected for days
 - (c) the body was buried without any waste of time
 - (d) they got rid of the corpse as soon as they could
7. When a dead miner was to be buried, his friends left the mine early
 - (a) with whatever tools they needed
 - (b) and held a church service before the burial
 - (c) and had a prayer meeting after the burial
 - (d) taking with them their picks and shovels
8. Because the ground was frozen hard
 - (a) the grave was sometimes not very deep
 - (b) it was not always possible to dig a deep hole
 - (c) the gravediggers had to use axes instead of spades
 - (d) the gravediggers loosened the frozen soil with small charges of dynamite
9. To get at the gold, dynamite was used
 - (a) to make new passages and tunnels deep underground
 - (b) to blast out the rock before it was carted away
 - (c) to break up and remove the rock before shifting it
 - (d) for sinking the deep shafts
10. To move the broken rock away
 - (a) pit ponies were used, pulling carts
 - (b) large baskets were used, dragged along the tunnels by miners
 - (c) teams of men worked, passing it from hand to hand
 - (d) carts were used, pulled by animals
11. To get the broken rock to the surface
 - (a) it was loaded into baskets and pulled up by rope
 - (b) pit ponies dragged it up long tunnels
 - (c) the pony carts were hoisted up on long ropes
 - (d) long lines were used to haul the baskets of rock
12. At the surface, the lumps of rock were broken into smaller pieces
 - (a) by special machines
 - (b) with handtools
 - (c) by using hammers and axes
 - (d) by a steam hammer
13. Running water was used
 - (a) to sort out the crushed materials, and clean them up
 - (b) to help break up the lumps of rock
 - (c) to clean out the rock containers
 - (d) to clean the rock fragments and clear away the rubbish

14. Before going underground every day, each miner
 - (a) put on a special thick jacket
 - (b) collected his protective clothing
 - (c) topped up his lamp with oil
 - (d) made sure there was enough fuel in his lamp
15. Before they could start work properly
 - (a) they had to clear away snow from the frozen entrance
 - (b) they had to make the long climb down the mine shaft
 - (c) there was the long journey down the mine shaft
 - (d) they had to thaw out the frozen equipment.
16. As they climbed down in the winter,
 - (a) there was ice all over the walls of the shaft
 - (b) the sides were thick with ice
 - (c) the howling wind sometimes blew out their lamps
 - (d) the freezing conditions were specially dangerous
17. The climbing men carried their food and tools
 - (a) by fixing a sack to their belts
 - (b) in rough baskets on long lines
 - (c) in a bag at the end of a rope
 - (d) in a sack that was tied to their belts
18. They needed their hands free as they climbed
 - (a) to deal with their safety ropes
 - (b) to hold their lamps
 - (c) for gripping the ice-cold bars
 - (d) to hold on to the frozen rungs
19. They still had a long way to go
 - (a) from the bottom to where they were digging
 - (b) before they were allowed to stop and rest
 - (c) from the end of the shaft to the workings
 - (d) before there was a break and something to eat.
20. As soon as it was dug out, the smashed rock was
 - (a) broken up still further
 - (b) loaded up and pulled away in carts
 - (c) shovelled into carts and dragged away
 - (d) pounded up into smaller pieces
21. The only pauses during the day were
 - (a) for refreshment
 - (b) to eat and drink
 - (c) half an hour mid morning and afternoon
 - (d) to give the men a rest after their midday meal.
22. Each man carried a bottle with him
 - (a) but there was plenty of drinking water underground
 - (b) but it was not used much because of the cold
 - (c) containing a day's supply of liquid
 - (d) with enough water to last all day
23. At the end of the day, the men had
 - (a) make sure the mine was safe for the night before they left
 - (b) to face the long walk back to where the ladders rose to the surface
 - (c) to make the weary trip to the bottom of the mine shaft
 - (d) to check everything very carefully before stopping work

24. Because the day's work was so hard
- (a) the long climb back to the top at the end of the day was very tiring
 - (b) the men were exhausted by the climb back up to the shaft entrance
 - (c) the working day was quite short
 - (d) miners worked for only a short time, with long rests.
25. The ponies stayed underground all night
- (a) sleeping in underground rooms dug out of the rock
 - (b) because it was too cold for them on the surface
 - (c) in stables hacked out from the rock far below the surface
 - (d) where it was warmer and more comfortable.

Test for

(Red test)

**"The Miners of Yukvak Island —
Daily Life in the Frozen North"**

There are four choices in each question.

One explains exactly what the passage meant. Use two ticks on the answer sheet to show this one.

One explains what the passage meant, but is not quite so exact. Use one tick on the answer sheet to show that one.

The others might seem true, but it does not say so in the passage. Do not put anything by them.

EXAMPLE:

Yukvak Island was

- | | | |
|-----|--|-----|
| (a) | a rather uncomfortable place to live | (a) |
| (b) | a cold and lonely island near the Arctic | (b) |
| (c) | the largest island in the area | (c) |
| (d) | nearly 20 miles wide. | (d) |

(b) is exactly what the passage meant

(a) is what the passage meant, but not so exact

(c) and (d) might be true, but it does not say so in the passage. So the answer sheet should look like this:

(a)	✓
(b)	✓✓
(c)	
(d)	

QUESTIONS:

1. People started coming to the island because
 - (a) there was a monthly boat from the mainland
 - (b) there was gold there
 - (c) at least some of them built quite comfortable cabins to live in
 - (d) there was a valuable metal waiting to be dug out of the ground
2. It was a harsh life, and many died
 - (a) on the voyage across the stormy seas
 - (b) of cold
 - (c) at work
 - (d) while underground in the mines
3. Men went down to the beaches
 - (a) to find wood for their cooking fires and heating
 - (b) because that was the most sheltered place to be
 - (c) to gather the fuel they needed each day
 - (d) to wait for the ship that came in each month
4. Winters were specially uncomfortable because
 - (a) their cabins were made only from rock and driftwood
 - (b) they only had driftwood to make furniture
 - (c) the tents they used were not enough to keep out the cold
 - (d) their shelters were just not enough for that kind of weather

5. The miners who had been there longest
 - (a) lived in simple buildings
 - (b) used cabins built from rocks and wood
 - (c) were lonelier than the others, although they had the most comfortable homes
 - (d) knew how to make the best furniture from the wood they found on the beaches
6. Some men used photographs of their families
 - (a) as pictures for the walls of their cabins
 - (b) to lessen the loneliness
 - (c) to remind them of the world beyond the island
 - (d) to decorate their shelters
7. Wood collected from the beaches
 - (a) was sometimes used to make beds
 - (b) was left to dry on the rocks
 - (c) was used for carving decorations for the walls
 - (d) could be used to make simple furniture
8. The icy cold kept men awake at night
 - (a) if they slept in tents
 - (b) unless one man stayed up to look after the fire
 - (c) however well covered they were
 - (d) even if they heaped themselves with blankets
9. Fresh water had to be
 - (a) carried in containers from the well to the camp
 - (b) brought to the island on the monthly boat
 - (c) fetched from the well in buckets whenever it was needed
 - (d) used quickly before it froze over
10. In such conditions, only the best leather
 - (a) made good footwear
 - (b) was used in strengthening the small canvas tents
 - (c) could be used to make water buckets
 - (d) was any good for the mens' boots
11. One man stayed in camp each day
 - (a) to collect firewood from the beaches
 - (b) to get the dinner ready for the others
 - (c) to guard the camp
 - (d) to prepare some food for the evening
12. The camp cook got up first in the mornings
 - (a) to get a good meal ready for the others
 - (b) so that the men could have a good breakfast before their long day's work
 - (c) because he had to collect firewood
 - (d) to check the fishing nets down by the water
13. The duty cook also prepared food for the others
 - (a) if they were sick, and had to stay in camp
 - (b) to take to work with them
 - (c) if they were away shooting or fishing for the day
 - (d) to take with them to the mines

14. Old tins were used
 - (a) as pots and pans
 - (b) for carrying water
 - (c) for simple furniture
 - (d) for cooking
15. Stores and equipment came from the mainland
 - (a) in an old ship called the Yukvak Princess
 - (b) in the monthly transport
 - (c) by boat each month
 - (d) but things were often damaged by salt water during the voyage
16. In the winter the monthly boat
 - (a) was sometimes stopped by storms
 - (b) could be turned back by the weather
 - (c) often never even sailed from the mainland
 - (d) was in real danger from drifting ice
17. There was only one place to unload the ship
 - (a) that was fairly near the camp
 - (b) where there was enough shelter from the rough seas
 - (c) because of all the rocks and cliffs
 - (d) where the the ship would be safe from the wild winter waters
18. Men awaited the ship eagerly, because
 - (a) food supplies were often running low
 - (b) of the newspapers it brought to the lonely island
 - (c) the lonely men were keen to get fresh reading matter
 - (d) every new face was always welcome in this lonely place
19. When the ship left the island it carried
 - (a) almost as much as it did on its journey to the island
 - (b) great chests of newly mined gold
 - (c) messages from the lonely miners to those waiting for them at home
 - (d) many letters from miners to their wives and families
20. Music helped pass the long evenings, and
 - (a) the few who had instruments took great care of them
 - (b) the singing and playing often lasted far into the night
 - (c) the few fiddles in the camp were carefully looked after
 - (d) men could forget their loneliness as they listened round the fire
21. Good singing was enjoyed too,
 - (a) but not all camps had good singers
 - (b) and men often sang while they worked
 - (c) and miners would walk a long way from other camps to listen to a good singer
 - (d) though good performers were not so common
22. During the long summer evenings some miners
 - (a) did little but dream of the gold they hoped to find
 - (b) sat and talked endlessly of how they would spend the fortunes they hoped to make
 - (c) went off with their weapons to find seabirds
 - (d) took their guns to the sea cliffs to look for birds

23. There was a strange and fishy flavour
(a) even to the porridge and coffee brewed over those smoky cooking fires
(b) to much of the food eaten on that wild island
(c) to the birds that the miners sometimes shot
(d) to the food when the shooting parties had some poor creature to add to the pot
24. Sometimes anglers came back to camp
(a) nearly frozen by the ice cold waters
(b) cold, wet, and angry
(c) with newly caught fish to add to the meal
(d) with fresh food from the surrounding sea
25. Many men went early to their beds because
(a) digging all day was so tiring
(b) it was the only way to keep warm
(c) their work was very tiring
(d) it saved firewood and fuel for the lamps
-)
-)

Blue Test Answer Sheet

The Treasure Beneath the Snow
— Mining for Gold on Yukvak
Island

NAME: _____ BOY/GIRL: _____

AGE: _____ GROUP 1/ GROUP 2: _____

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Red Test Answer Sheet

*The Miners of Yukvak Island -
Daily Life in the Frozen North*

NAME: _____

BOY/GIRL: _____

AGE: _____

GROUP 1/ GROUP 2: _____

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APPENDIX SEVEN.

**Experimental material from
Study Seven.**

topic 1:

Battle of Britain

introduction:

The summer of 1940 was a dangerous time for Britain.

para 1:

main point

supporting points

The Germans were expected to invade any day

1. the Germans had overrun France, and chased the British into the sea at Dunkirk
2. their huge and victorious army, navy and air force were waiting for orders to attack
3. the British were alone, with no friends
4. nearest Germans were only 20 miles away from British coast, just across the English Channel

para 2:

main point

supporting points

The Germans had to destroy the British air force before they could risk the invasion across the Channel

1. Ships carrying an invading army made easy targets for bombers
2. Soldiers could be machine gunned by fighter aircraft as they came ashore on the invasion beaches
3. The British soldiers would be able to defend their beaches much better with help from their air force
4. Even a small number of fighters and bombers could make a landing dangerous

para 3:

main point

The German air force was much stronger than the British air force

1. The Germans had been building up their numbers of fighters and bombers for years
2. They had plenty of pilots
3. The British had lost many aircraft in the retreat from France
4. They were desperately short of aircrew

para 4:

main point:

supporting points

the Germans forced the British air force come up and fight

1. German bombers attacked British cities.
2. They attacked British shipping convoys
3. They attacked British airfields
4. They attacked British radar stations

para 5:
main point

Britain's air defences were not ready for the battle

supporting points

1. British fighter aircraft were too old and too few
2. There were not enough anti-aircraft guns
3. There were too few barrage balloons
4. Early warning radar was still very new and untried

para 6:
main point

everyone did something to get ready for the expected invasion

supporting points

1. People rushed to join the Home Guard, armed with anything from 12-bore rifles to axes and golf clubs
2. Roads near possible landing beaches were blocked off with old lorries and carts
3. Many men and women became air raid wardens
4. Others set up first aid posts, soup kitchens and shelters for people who had been bombed.

para 7:
main point

Incredibly, the British air force won the battle for the skies above Britain.

supporting points

1. Day after day German fighters and bombers attacked
2. Day after day the handful of British fighters hurled themselves at the enemy
3. Both sides suffered terrible losses
4. But the German losses were much greater.

Conclusion:

The German leaders decided not to invade that summer. They expected to get another chance later. That chance never came.

Topic 2:

Daily life at home

Introduction:

In the Second World War, life was hard at home.

para 1:

main point

Before long, almost all the men were away at the war.

supporting points

1. The army was too small, and had to expand if Germany was to be beaten.
2. Men were needed for the Royal Navy.
3. The Royal Air Force was desperately short of pilots, navigators, gunners, engineers and ground staff.
4. Men were needed for the merchant ships that brought in all the supplies we needed.

para 2:

main point

It was a worrying time for mothers and children left at home when their menfolk went to war

supporting points

1. When a man was killed, news of the death usually came to the home by telegram.
2. There was heavy loss of life in the retreat from France and Dunkirk.
3. The vital convoys across the North Atlantic from America cost the lives of hundreds of sailors each month.
4. The war in the air claimed more dead every week.

para 3:

main point

Women had to do the work usually done by men.

supporting points

1. When the men went off to fight, they left their old jobs behind them.
2. The work had to be done.
3. Factories had to keep going.
4. There was a shortage of mechanics, drivers, workers of all kinds.

para 4:

main point

The big cities were dangerous places to live in.

supporting points

1. The Germans bombed our towns.
2. Whole streets were completely flattened.
3. There were raids every night.
4. Homes were smashed to bits.

para 5:

main point

Children and sick people were moved away to live in the country.

supporting points

1. The city was certainly no place to be unnecessarily.
2. It was safer far out of town.
3. City hospitals and rescue services were soon desperately overstretched.
4. Unneeded people were in the way.

para 6:

main point

There was not enough food for everyone, so it had to be rationed

supporting points

1. Britain did not grow enough food to feed itself, and had for a long time imported food from overseas.
2. But now the sea routes were dangerous, and under attack by German submarines.
3. Thousands of tons of grain, provisions and tinned foods were sunk in the savage convoy attacks.
4. The shelves in the shops were getting empty.

para 7:

main point

Trains and buses were always very crowded indeed.

supporting points

1. Preparing for and fighting a war means moving about huge numbers of men.
2. Men have to travel to join their units.
3. They go on leave, and come back.
4. Their units are moved about.

Conclusion

But people kept smiling.

They felt that they were all in it together.

Many remember the war as good years.

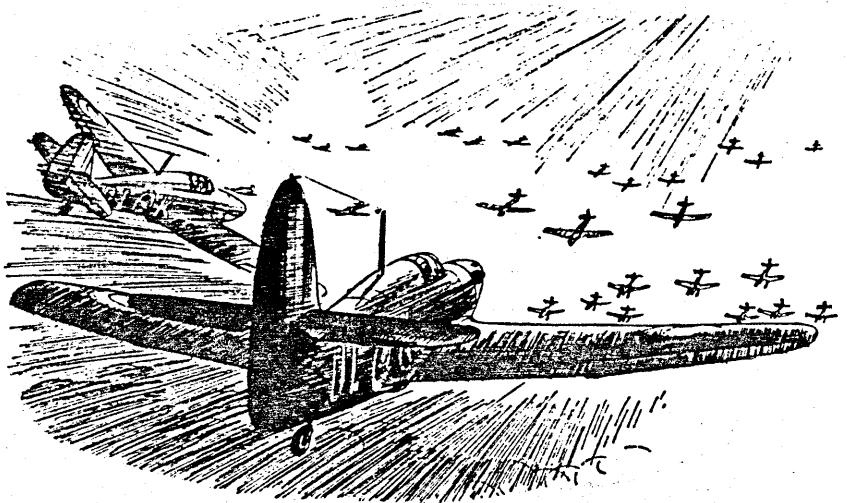
The summer of 1940 was a dangerous time for Britain.

The Germans had overrun France, and chased the British into the sea at Dunkirk. Their huge and victorious army, navy and air force were waiting for orders to attack. The British were alone, with no friends. The nearest Germans were only twenty miles away from the British coast, just across the English Channel. The Germans were expected to invade any day.

Ships carrying an invading army made easy targets for bombers. Soldiers could be machine gunned by fighter aircraft as they came ashore on the invasion beaches. The British soldiers would be able to defend their beaches much better with help from their air force.

Even a small number of fighters and bombers could make a landing dangerous.

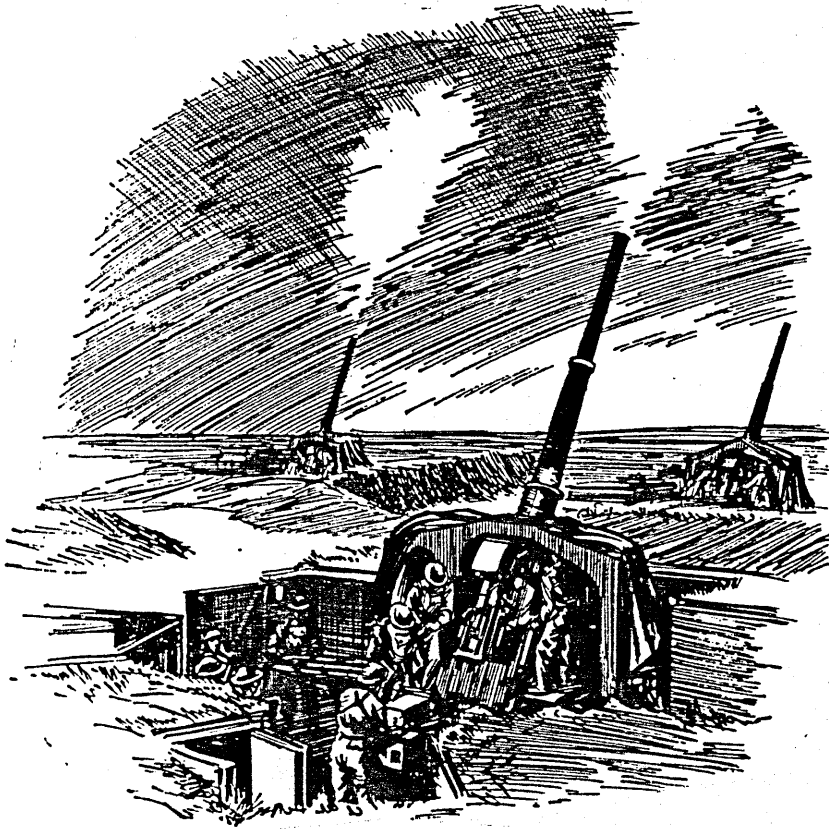
The Germans had to destroy the British air force before they could risk the invasion across the Channel.



The Germans had been building up their numbers of fighters and bombers for years. They had plenty of pilots. The British had lost many aircraft in the retreat from France. They were

desperately short of aircrew. The German air force was much stronger than the British air force.

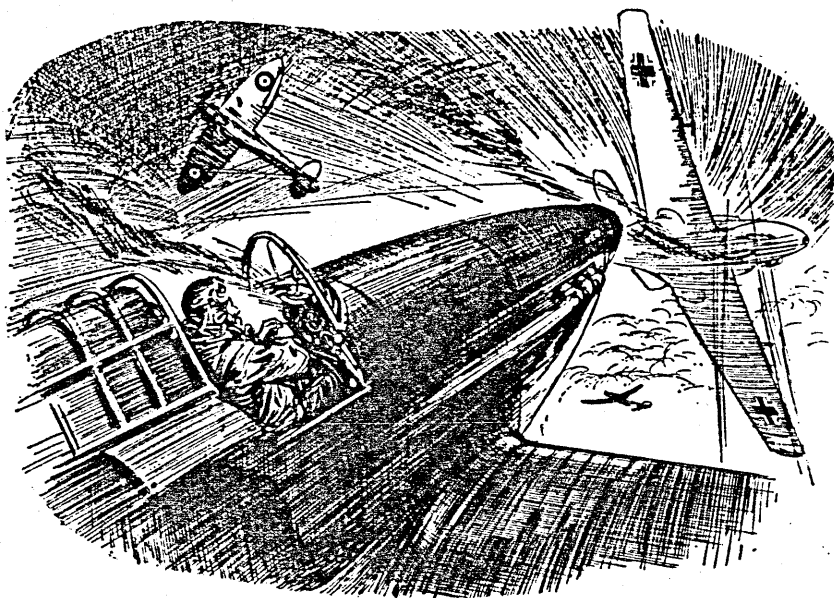
German bombers attacked British cities. They attacked British shipping convoys. They attacked British airfields. They attacked British radar stations. The Germans forced the British air force come up and fight.



British fighter aircraft were too old and too few. There were not enough anti-aircraft guns. There were too few barrage balloons. Early warning radar was still very new and untried. Britain's air defences were not ready for the battle.

People rushed to join the Home Guard, armed with anything from 12-bore rifles to axes and golf clubs. Roads near possible landing beaches were blocked off with old lorries and carts. Many men and women became air raid wardens. Others set up first aid posts, soup kitchens and shelters for people who had been bombed. Everyone did something to get ready for the expected invasion.

Day after day German fighters and bombers attacked. Day after day the handful of British fighters hurled themselves at the enemy. Both sides suffered terrible losses. But the German losses were much greater. Incredibly, the British air force won the battle for the skies above Britain.



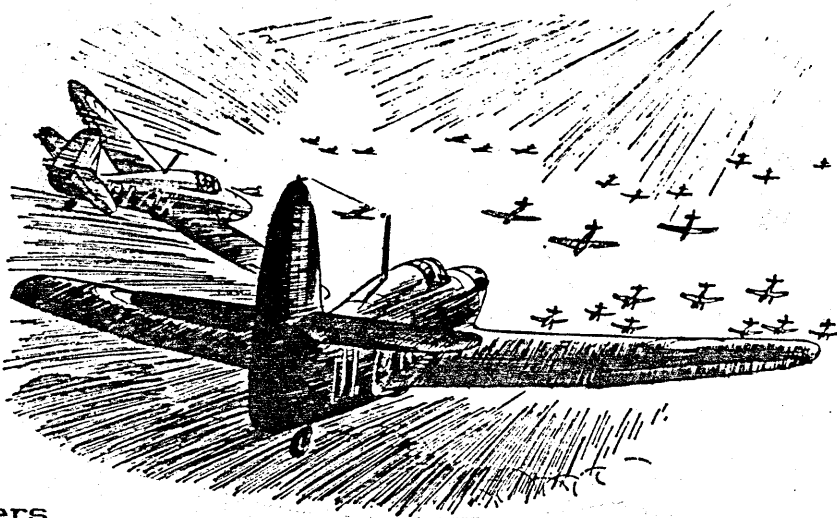
The German leaders decided not to invade that summer. They expected to get another chance later. That chance never came.

The summer of 1940 was a dangerous time for Britain.

The Germans were expected to invade any day. They had overrun France, and chased the British into the sea at Dunkirk. Their huge and victorious army, navy and air force were waiting for orders to attack. The British were alone, with no friends. The nearest Germans were only twenty miles away from the British coast, just across the English Channel.

The Germans had to destroy the British air force before they could risk the invasion across the Channel. Ships carrying an invading army made easy targets for bombers. Soldiers could be machine gunned by fighter aircraft as they came ashore on the invasion beaches.

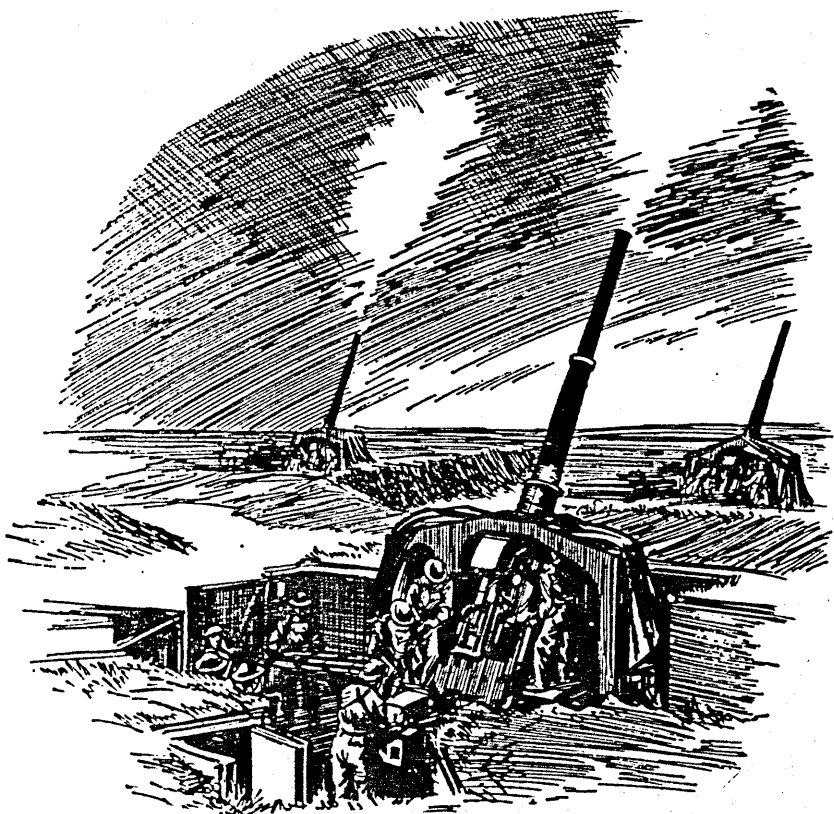
The British soldiers would be able to defend their beaches much better with help from their air force. Even a small number of fighters and bombers could make a landing dangerous.



The German air force was much stronger than the British air force. The Germans had been building up their numbers of fighters and bombers for years. They had plenty of pilots.

The British had lost many aircraft in the retreat from France. They were desperately short of aircrew.

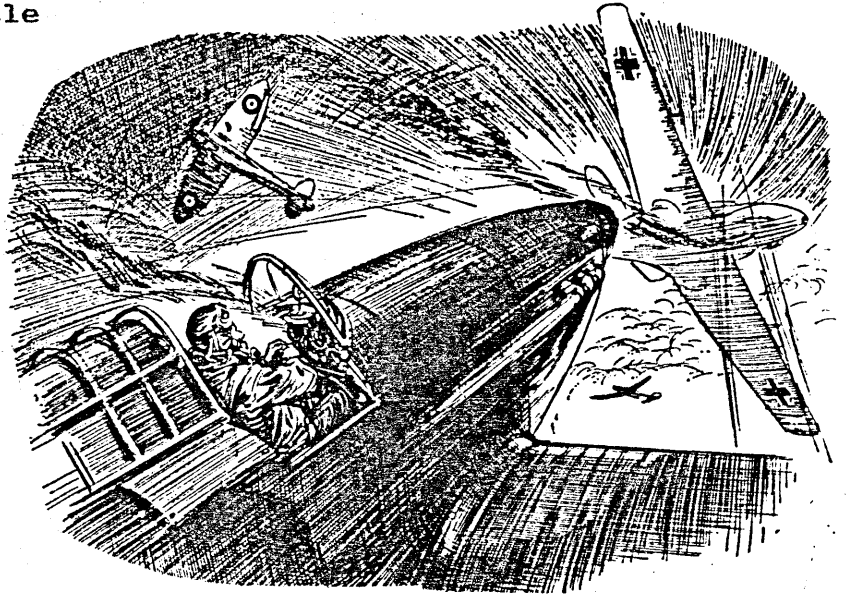
The Germans forced the British air force come up and fight. German bombers attacked British cities. They attacked British shipping convoys. They attacked British airfields. They attacked British radar stations.



Britain's air defences were not ready for the battle. British fighter aircraft were too old and too few. There were not enough anti-aircraft guns. There were too few barrage balloons. Early warning radar was still very new and untried.

Everyone did something to get ready for the expected invasion. People rushed to join the Home Guard, armed with anything from 12-bore rifles to axes and golf clubs. Roads near possible landing beaches were blocked off with old lorries and carts. Many men and women became air raid wardens. Others set up first aid posts, soup kitchens and shelters for people who had been bombed.

Incredibly, the British air force won the battle for the skies above Britain. Day after day German fighters and bombers attacked. Day after day the handful of British fighters hurled themselves at the enemy. Both sides suffered terrible losses. But the German losses were much greater.



The German leaders decided not to invade that summer. They expected to get another chance later. That chance never came.

In the Second World War, life was hard at home.

Before long, almost all the men were away at the war. The army was too small, and had to expand if Germany was to be beaten. Men were needed for the Royal Navy. The Royal Air Force was desperately short of pilots, navigators, gunners, engineers and ground staff. Men were needed for the merchant ships that brought in all the supplies we needed.



It was a worrying time for mothers and children left at home when their menfolk went to war. When a man was killed, news of the death usually came to the home by telegram. There was heavy loss of life in the retreat from France and Dunkirk. The vital convoys across the North Atlantic from America cost the lives of hundreds of sailors each month. The war in the air claimed more dead every week.

Women had to do the work usually done by men. When the men went off to fight, they left their old jobs behind them. The work had to be done. Factories had to keep going. There was a shortage of mechanics, drivers, workers of all kinds.

The big cities were dangerous places to live in. The Germans bombed our towns. Whole streets were completely flattened. There were raids every night. Homes were smashed to bits.

Children and sick people were moved away to live in the country. The city was certainly no place to be unnecessarily. It was safer far out of town. City hospitals and rescue services were soon desperately overstretched. Unneeded people were in the way.

There was not enough food for everyone, so it had to be rationed. Britain did not grow enough food to feed itself, and had for a long time imported food from overseas. But now the sea routes were dangerous, and under attack by German



submarines. Thousands of tons of grain, provisions and tinned foods were sunk in the savage convoy attacks. The shelves in the shops were getting empty.

Trains and buses were always very crowded indeed. Preparing for and fighting a war means moving about huge numbers of men. Men have to travel to join their units. They go on leave, and come back. Their units are moved about.

But people kept smiling. They felt that they were all in it together. Many remember the war as good years.

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When the men went off to fight, they left their old jobs behind them. The work had to be done. Factories had to keep going. There was a shortage of mechanics, drivers, workers of all kinds. Women had to do the work usually done by men.

The Germans bombed our towns. Whole streets were completely flattened. There were raids every night. Homes were smashed to bits. The big cities were dangerous places to live in.

The city was certainly no place to be unnecessarily. It was safer far out of town. City hospitals and rescue services were soon desperately overstretched. Unneeded people were in the way. Children and sick people were moved away to live in the country.

Britain did not grow enough food to feed itself, and had for a long time imported food from overseas. But now the sea routes were dangerous, and under attack by German submarines. Thousands of tons of grain, provisions and tinned foods were sunk in the savage convoy attacks. The shelves in the shops



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Preparing for and fighting a war means moving about huge numbers of men. Men have to travel to join their units. They go on leave, and come back. Their units are moved about. Trains and buses were always very crowded indeed.

But people kept smiling. They felt that they were all in it together. Many remember the war as good years.

Red Test: "Battle of Britain"

Part A: *Some of the following statements are True (T), some are False (F), and for some there is Not Enough Evidence (NEE) to say if they are true or false. Tick the box on the answer sheet to show which each statement is.*

1. The Germans had to wait for the right time of year before attacking Britain.
2. The German army was expected to attack across the Channel any day
3. The Germans could not invade until they had beaten the British air force.
4. The British knew they had plenty of time to prepare for any German invasion.
5. The Germans knew they had nothing to fear from the British air force when they launched their invasion.
6. A few German generals realised from the start that the British air force was more dangerous than it seemed.
7. The British air force was very strong at the beginning of the Battle of Britain.
8. The British had far fewer aeroplanes than the Germans.
9. British fighters were slower than the German aircraft, but more heavily armed.
10. The Germans planned to wipe out the British air force by making it come up and fight.
11. German pilots came to dread their attacks on such well defended targets as London.
12. Britain was not ready to defend itself against air attack.
13. Britain's air defences were in top condition at the start of the air battle.
14. Everyone got ready to fight back against the Germans when they landed.
15. The Germans knew they had to avoid direct combat with the British air force at all costs.
16. Too much money had been spent on new ships for the Navy, so there were too few aircraft.
17. People who lived near possible landing beaches were moved out of their homes.
18. Most people did very little to help get ready for a German landing.

- 19 Unbelievably, the mighty German air force was beaten off by the British air force
20. In the end, it was a shortage of pilots more than loss of aircraft that slowed up the German air attack.
21. The German air force won the Battle of Britain without any difficulty.

Part B: *Here are five paragraphs about the passage.
One is right, and explains exactly what the passage was about.
The others have some mistakes: one has one mistake in it, one has two, one has three, and one has four mistakes.
On your answer sheet, show which is which.*

1. Because the Germans had beaten the British in France, they were expected to launch an attack against England very soon. Although an invading force could be attacked very easily from the air, they thought they could risk such an attack before the British air force had been destroyed. The German air force was not well equipped, and had suffered many losses, but it was much stronger than the British air force. By attacking the British from the air, they forced the British air force up to fight. But after a fierce air struggle, the Germans realised that their losses were too great, and they could not win control of the skies over Britain.
2. Because the Germans had beaten the British in France, they were expected to launch an attack against England very soon. But they could not risk such an attack until the British air force had been destroyed, because an invading force could be attacked very easily from the air. The German air force was well equipped, and had suffered fewer losses than the British, so it was much stronger. By attacking the British from the air, they forced the British air force up to fight. But after a fierce air struggle, the Germans realised that their losses were too great, and they could not win control of the skies over Britain.
3. Although the Germans had been beaten by the British in France, they were expected to launch an attack against England very soon. Although an invading force could be attacked very easily from the air, they thought they could risk such an attack before the British air force had been destroyed. The German air force was not well equipped, and had suffered many losses, but it was much stronger than the British air force. By attacking the British from the air, they forced the British air force up to fight. But after a fierce air struggle, the Germans realised that their losses were too great, and they could not win control of the skies over Britain.

4. Because the Germans had beaten the British in France, they were expected to launch an attack against England very soon. But they could not risk such an attack until the British air force had been destroyed, because an invading force could be attacked very easily from the air. The German air force was not well equipped, and had suffered many losses, but it was much stronger than the British air force. By attacking the British from the air, they forced the British air force up to fight. But after a fierce air struggle, the Germans realised that their losses were too great, and they could not win control of the skies over Britain.

5. Although the Germans had been beaten by the British in France, they were expected to launch an attack against England very soon. Although an invading force could be attacked very easily from the air, they thought they could risk such an attack before the British air force had been destroyed. The German air force was not well equipped, and had suffered many losses, but it was much stronger than the British air force. By attacking the British from the air, they forced the British air force up to fight. After a fierce air struggle, and despite many losses, the Germans won control of the skies over Britain.

Blue Test: "Daily Life at Home"

Part A: *Some of the following statements are True (T), some are False (F), and for some there is Not Enough Evidence (NEE) to say if they are true or false. Tick the box on the answer sheet to show which each statement is.*

1. Most men did not wait to be called up, but went to volunteer.
2. Many factories had to close down when the men who worked in them were called up.
3. The women and children at home did not worry too much about their men away at the war.
4. Very soon, most men had left home to take part in the war.
5. The women and children left at home had good reason to worry about their absent men.
6. Although many men were away at the war, there were many left at home.
7. There were few chances for men to write letters home, so that made the worry worse for the families at home.
8. Women took over the work that had been done by the men.
9. It was mainly older women who went to work in the factories and farms.
10. Because there were plenty of convoys bringing food into the country, there was plenty of food for everyone.
11. Although the Germans bombed cities, very few people were hurt, and there was no real danger.
12. It was mostly cities in the south and east that were heavily bombed.
13. Those who did not need to stay in the towns were moved away to the country.
14. It was dangerous to stay on in the big towns and cities.
15. People were very unwilling to be moved when the bombing started.
16. Because of shortages, food had to be rationed.
17. People were moved from the country into the towns when the bombing started.
18. For a long time, it was difficult to get bread, because many bakeries had been bombed.
19. Some people preferred to travel at night, because trains were less crowded then.

20. Trains and buses were packed with soldiers, sailors and airmen.
21. Once the war started, people did not want to travel much, so trains and buses were often nearly empty.

Part B: *Here are five paragraphs about the passage.
One is right, and explains exactly what the passage was about.
The others have some mistakes: one has one mistake in it, one has two, one has three, and one has four mistakes.
On your answer sheet, show which is which.*

1. Before long, the need for men to fight the war meant there were few men left at home. Women just could not do all the work that the men had done, and many farms and factories closed. Although there were heavy bombing raids on towns and cities, there was not much real danger. There was no need for anyone to be moved away to the country. Although it was difficult getting food from abroad, there was no need for food to be rationed.
2. Before long, the need for men to fight the war meant there were few men left at home. Women just could not do all the work that the men had done, and many farms and factories closed. The nightly bombing raids made it dangerous to stay on in the big towns and cities. It was better for everyone if those who did not need to stay in the towns were moved away to the country. The difficulty of getting food from abroad meant serious shortages, and soon food had to be rationed.
3. Before long, the need for men to fight the war meant there were few men left at home. Women just could not do all the work that the men had done, and many farms and factories closed. Although there were heavy bombing raids on towns and cities, there was not much real danger. There was no need for anyone to be moved away to the country. The difficulty of getting food from abroad meant serious shortages, and soon food had to be rationed.
4. Before long, the need for men to fight the war meant there were few men left at home. Because the work left behind by the men still had to be done, it was now done by women. The nightly bombing raids made it dangerous to stay on in the big towns and cities. It was better for everyone if those who did not need to stay in the towns were moved away to the country. The difficulty of getting food from abroad meant serious shortages, and soon food had to be rationed.

5. Before long, the need for men to fight the war meant there were few men left at home. Women just could not do all the work that the men had done, and many farms and factories closed. Although there were heavy bombing raids on towns and cities, there was not much real danger. But still, it was better for everyone if those who did not need to stay in the towns were moved away to the country. The difficulty of getting food from abroad meant serious shortages, and soon food had to be rationed.

Red Test Answer Form, for "Battle of Britain"

NAME: _____ BOY/ GIRL: _____

AGE: _____ GROUP 1/2: _____

Part A: *Some of the statements are True (T), some are False (F), and for some there is Not Enough Evidence (NEE) to say if they are true or false. Tick the box on the answer sheet to show which each statement is.*

Question	T	F	NEE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Question	T	F	NEE
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Part B: *Here are five paragraphs about the passage.
One is right, and explains exactly what the passage was about.
The others have some mistakes: one has one mistake in it, one has two, one has three, and one has four mistakes.
On your answer sheet, show which is which.*

Paragraph _____ has no mistakes. It is exactly right.

Paragraph _____ has one mistake.

Paragraph _____ has two mistakes.

Paragraph _____ has three mistakes.

Paragraph _____ has four mistakes.

Blue Test Answer Form, for "Daily Life at Home"

NAME: _____ BOY/ GIRL: _____

AGE: _____ GROUP 1/2: _____

Part A: *Some of the statements are True (T), some are False (F), and for some there is Not Enough Evidence (NEE) to say if they are true or false. Tick the box on the answer sheet to show which each statement is.*

Question	T	F	NEE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

Question	T	F	NEE
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Part B: *Here are five paragraphs about the passage.
One is right, and explains exactly what the passage was about.
The others have some mistakes: one has one mistake in it, one has two, one has three, and one has four mistakes.
On your answer sheet, show which is which.*

Paragraph _____ has no mistakes. It is exactly right.

Paragraph _____ has one mistake.

Paragraph _____ has two mistakes.

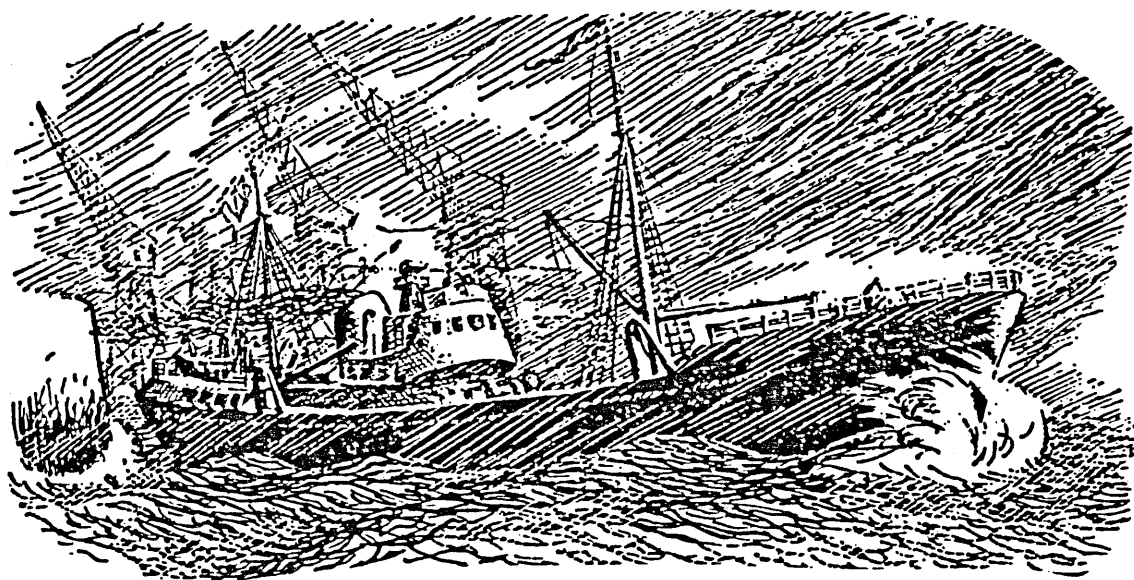
Paragraph _____ has three mistakes.

Paragraph _____ has four mistakes.

APPENDIX EIGHT.

**Experimental material from
Study Eight.**

Every day, fishermen leave harbours all up and down our coast to catch fish for us. It can be dangerous, and sometimes families wait at home for boats that never return. These fishing boats are not usually very big. Such boats can get into trouble easily. When they are out on the fishing grounds, they are a long way from help. In these distant waters, the greatest danger is from the weather, specially in the winter. Gales can blow for days and days on end. The wind causes huge waves, which can easily damage ships. Also, bad weather can make men very tired, and men who are tired can make dangerous mistakes.



In winter it can be specially bad, with high seas and strong winds for days on end. In gales, the wave tops break, and are whipped away. The freezing air is full of flying spray from the breaking waves. That means a danger from ice, as the flying spray freezes onto the boat. Water freezes as it touches the icy metal. Layers of ice build up all over the topworks, and slowly the boat gets dangerously top heavy. Then, in huge seas like that, there is a danger of capsizing.

There are some other, less obvious dangers. Little more than thirty years ago, a war was fought around the coast of Britain. There are dangers left from this war. Both sides laid many thousands of mines. These mines lurked below the sea's surface, an unseen and deadly menace. They sank enemy ships, and

protected harbours and possible landing beaches. Just one mine was easily strong enough to blow a small ship in half.

Some of these mines were never cleared. They were left lying half buried on the seabed, or sometimes drifting loose. Obviously, they are a great danger to all shipping. Sometimes fishing boats catch mines in their nets. They could just cut the nets away, but then the catch would be lost as well. That would mean there would be no profit from the trip. Also, nets are expensive, and no boat could afford that easily.

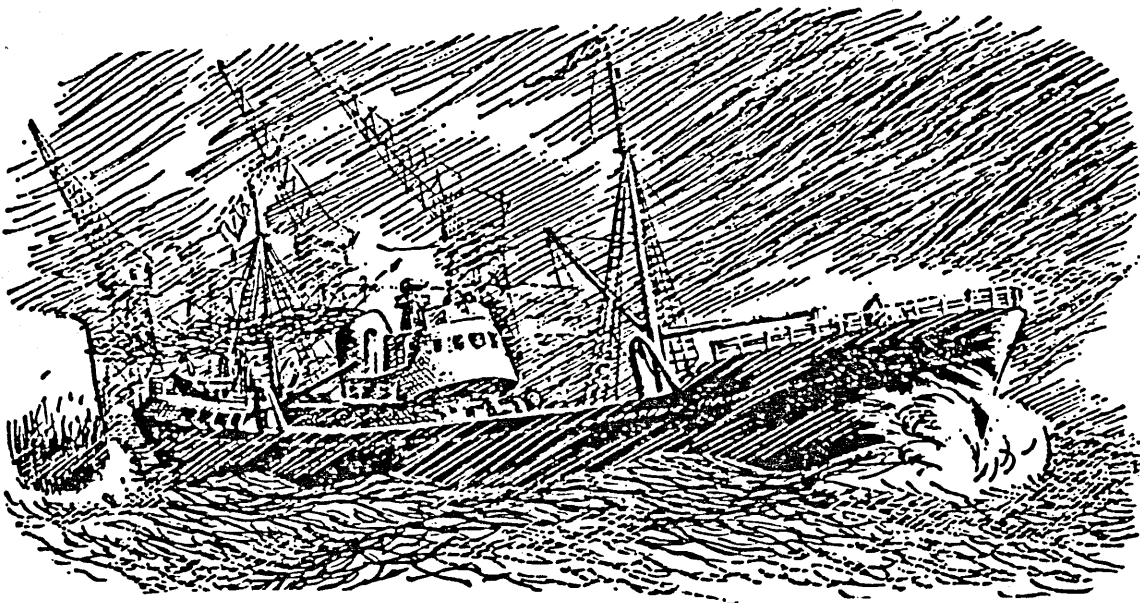
So usually the net is hauled back onboard. As it comes in, the mine is dragged towards the boat. The mine is then on deck. Because an unexploded mine is so dangerous, an urgent radio message is sent to the Navy for help. The message is quickly passed on to the bomb disposal experts, who deal with mines too. They need to get there as fast as possible. Quickly, a boat or helicopter brings a bomb disposal officer to the ship.

The mine has been left untouched for thirty years or more. In that time, it has been soaked and battered by the endlessly moving sea. It is probably in very dangerous condition. The bomb disposal officer can make it safe or explode it. To make it safe, he has to find and take out the firing mechanism. If it has been too badly damaged by the sea, this is too dangerous. So, it is put back in water, and blown up at safe distance.



Occasionally, though, mines explode before help arrives. The little ship is torn apart by the explosion, and quickly sinks. Then we hear on the news of a missing fishing boat. But fishermen are used to tragedy. Usually it is the weather that kills, but the sea has many other dangers as well. Drifting mines are just one of them, and probably they have sunk many fishing boats. Even so, the boats still go to sea.

Every day, fishermen leave harbours all up and down our coast to catch fish for us. It can be dangerous, and sometimes families wait at home for boats that never return. These fishing boats are not usually very big. They are gaily painted and beautifully kept. When they are out on the fishing grounds, they are a long way from help. In these distant waters, the greatest danger is from the weather, specially in the winter. There are many foreign ships in these waters too. The wind causes huge waves, which can easily damage ships. Also, bad weather can make men very tired, and men who are tired can make dangerous mistakes.



In winter it can be specially bad, with high seas and strong winds for days on end. Most fishermen usually work watches of four hours. The freezing air is full of flying spray from the breaking waves. That means a danger from ice, as the flying spray freezes onto the boat. Layers of ice build up all over the topworks, and slowly the boat gets dangerously top heavy. Then, in huge seas like that, there is a danger of capsizing. Many of the boats were built in east coast ports.

There are some other, less obvious dangers. Little more than thirty years ago, a war was fought around the coast of Britain. The British leader was the famous Churchill. Both sides laid many thousands of mines. They sank enemy ships, and protected harbours

and possible landing beaches. People did not go to the seaside for holidays during the war. Just one mine was easily strong enough to blow a small ship in half.

Some of these mines were never cleared. They were left lying half buried on the seabed, or sometimes drifting loose. Some mines had been laid by ships, and some by aircraft. Sometimes fishing boats catch mines in their nets. They could just cut the nets away, but then the catch would be lost as well. Also, nets are expensive, and no boat could afford that easily. Much modern fishing equipment is expensive, specially electronic equipment.

So usually the net is hauled back onboard. The mine is then on deck. The working deck of most fishing boats is midships. Because an unexploded mine is so dangerous, an urgent radio message is sent to the Navy for help. The message is quickly passed on to the bomb disposal experts, who deal with mines too. Quickly, a boat or helicopter brings a bomb disposal officer to the ship. Quite often, it will be a police boat or coastguard boat.

The mine has been left untouched for thirty years or more. Since the war, there have been more than thirty years of peace in Europe. It is probably in very dangerous condition. The bomb disposal officer can make it safe or explode it. To make it safe, he has to find and take out the firing mechanism. Otherwise, it is put back in water, and blown up at safe distance. The men in the Navy who do this dangerous work are called Clearance Divers.



Occasionally, though, mines explode before help arrives. Then we hear on the news of a missing fishing boat. Perhaps we hear the news on the car radio, or read it in the papers. But fishermen are used to tragedy. Most fishing families have sent men to sea for generations and generations. Usually it is the weather that kills, but the sea has many other dangers as well. Even so, the boats still go to sea.

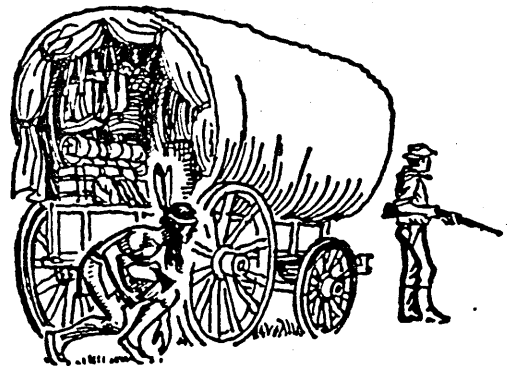
Through the last century, thousands of families crossed America to the new lands in the west. There were no railways, so the long and difficult journey was made in covered wagons. Each month, hundreds of families arrived from Europe. Mostly they were farming folk, and they were all hungry for land, lots of land. There had been a shortage of land back home in Europe. But the east coast of America was getting crowded, and the best land was taken. The new lands to the west were still almost empty. Very few people had yet moved there. There was rich soil and good farmland in the west, waiting to be opened up and used.

So they had to find a way to cross hundreds of miles of prairies, deserts and mountains. The land was too difficult and dangerous for families to travel alone. They had to find ways of travelling in groups. The only way was in trains of covered wagons, pulled by horses or oxen. That way each family could carry all they needed to start their new life in the west. They had to take all the equipment, furniture, tools, food and cattle they would need. At the same time, they could help each other on the journey.

There was danger from hunger and thirst. There was always the risk of sickness, or wagons being broken on the rough ground. Most of the trail was very rough. But the greatest danger was from Indians. Many wagon trains were attacked as they passed through Indian territory. The Indians wanted to turn back these white people who were stealing their lands. Many families left loved ones behind them along the way, in rough, shallow graves.

Indian attacks were savage and without mercy. They killed when and where they could, men, women and children. Many wagon trains were wiped out, and many hundreds of settlers were killed.

The Indians had good reason to hate these newcomers. They were taking the lands that had always been Indian lands. They had crossed an ocean then a continent to take



what was not theirs. The Indians could not make peace with these people who were stealing their homes from them.

So they fought against them. They fought as hard and savagely as they could. Soon the U.S. Cavalry came to help the settlers. In the Indian Wars that followed, they beat the Indian tribes and forced them to live in reservations. They built forts near these reservations, to keep watch over the beaten tribes. But still, sometimes, war parties broke out of the reservations to attack the hated wagon trains. That meant further fighting and bloodshed on both sides.



The Indians knew the way the wagon trains had to come. The wagons were slow, and easy to follow. They laid their traps carefully and well. The attacks were sudden and unexpected. Often they caught the settlers by surprise, and unready to fight back. The clumsy, slow-moving wagons made easy targets. But they were tough and determined folk, these families, and sometimes they fought off the Indians.

They needed to be tough and determined. Their new life in the west was not an easy one. It was a place where only the strong would survive. It was no place for people who were weak or uncertain. As the years went by, the results of their strength could be easily seen. The empty valleys filled with farms, then small towns, and then cities. The once empty west became the rich and vigorous country we know today.

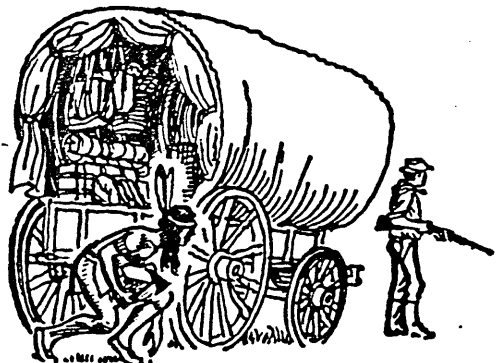
Through the last century, thousands of families crossed America to the new lands in the west. There were no railways, so the long and difficult journey was made in covered wagons. Each month, hundreds of families arrived from Europe. They crossed the Atlantic in slow old sailing ships. Mostly they were farming folk, and they were all hungry for land, lots of land. But the east coast of America was getting crowded, and the best land was taken. The good flat land was by the coast. The new lands to the west were still almost empty. There was rich soil and good farmland in the west, waiting to be opened up and used.

So they had to find a way to cross hundreds of miles of prairies, deserts and mountains. Some Indian tribes believed their gods lived in these empty lands. The land was too difficult and dangerous for families to travel alone. The only way was in trains of covered wagons, pulled by horses or oxen. That way each family could carry all they needed to start their new life in the west. At the same time, they could help each other on the journey. The wagons were usually made of new pinewood.

Many of the families were very poor. There was danger from hunger and thirst. There was always the risk of sickness, or wagons being broken on the rough ground. But the greatest danger was from Indians. Indian warriors were often named after fierce wild animals. Many wagon trains were attacked as they passed through Indian territory. Many families left loved ones behind them along the way, in rough, shallow graves.

Indian attacks were savage and without mercy. Many wagon trains were wiped out, and many hundreds of settlers were killed. A lot of them were families from countries in Southern Europe.

The Indians had good reason to hate these newcomers. One of the fiercest tribes was the Apache tribe. They were taking the lands that had always been Indian lands. The



Indians could not make peace with these people who were stealing their homes from them.

So they fought against them. Soon the U.S. Cavalry came to help the settlers. Many of the cavalymen were themselves newcomers to America. In the Indian Wars that followed, they beat the Indian tribes and forced them to live in reservations. They built forts near these reservations, to keep watch over the beaten tribes. Fort Laramie was one of the most famous of these forts. But still, sometimes, war parties broke out of the reservations to attack the hated wagon trains.



The Indians knew the way the wagon trains had to come. They laid their traps carefully and well. An Apache chief called Running Bear was one of the greatest Indian war leaders. The attacks were sudden and unexpected. The clumsy, slow-moving wagons made easy targets. But they were tough and determined folk, these families, and sometimes they fought off the Indians. One of the most savage attacks took place not far from the Red River.

They needed to be tough and determined. Some of the toughest were settlers from the starving farms of Ireland. Their new life in the west was not an easy one. It was no place for people who were weak or uncertain. Most of the new farms in the west had a mixture of cattle and crops. As the years went by, the results of their strength could be easily seen. The once empty west became the rich and vigorous country we know today.

Part A: *Some of the following statements are True (T), some are False (F), and for some there is Not Enough Evidence (NEE) to say if they are true or false. Tick the box on the answer sheet to show which each statement is.*

1. The only good land for the new settlers was in the West.
2. The east coast was heavily wooded, and that meant less farmland.
3. The wagon trains allowed the settlers to travel in large groups.
4. A lot of the settlers preferred to travel alone, carrying everything they needed with them.
5. When the newcomers arrived in America, they found farmland nearby.
6. Some of the wagons carried families of eight or nine people.
7. There was danger from sickness, accident, and Indian attack.
8. Despite all the dangers, very few settlers were killed on the journey.
9. The Indians attacked the settlers because they were stealing their lands.
10. The wagons at the back of the train were in the greatest danger.
11. There were not many attacks, because the Indians soon made peace.
12. The defeated Indians never managed to break out of their reservations.
13. The Sioux were the Indians the settlers feared most.
14. The U.S. Cavalry were finally called in to fight the tribes.
15. Some of the tribes accepted the forts and the settlers more quickly than others.
16. The Indians usually tried to take the settlers by surprise when they attacked the wagon trains.
17. The settlers never managed to beat off an attack once it had started.

18. Very few Indians had guns, and mostly they used bows and arrows, knives and tomahawks.
19. The land near the rivers was the most popular among the settlers.
20. Even when they arrived in the West, life was still pretty tough for the settlers.
21. Life in the rich valleys of the West was good and easy.

Part B: *Choose the best ending for each of these sentences. Put your answer on the answer sheet.*

1. The east coast of America was
 - (a) dangerous because of the Indians
 - (b) more crowded than the west
 - (c) where all the settlers wanted to go
 - (d) less crowded than the west
2. The land the settlers had to cross was
 - (a) easy except for the Indians
 - (b) mostly thick forest
 - (c) flat and empty desert
 - (d) rough and difficult
3. The settlers used covered wagons because
 - (a) they were slow moving and steady
 - (b) they never got broken by the rough ground
 - (c) they could carry everything they needed
 - (d) they were the quickest way to travel
4. The greatest danger on the journey was from
 - (a) the rough and difficult country
 - (b) sickness and disease
 - (c) attacks by the Indians
 - (d) the burning heat of the deserts
5. Indians attacked the wagon trains because
 - (a) the settlers were taking their lands
 - (b) they believed that white men were evil
 - (c) they hated the U.S. Cavalry
 - (d) Indian warriors loved fighting
6. Forts were built
 - (a) by the Indians
 - (b) by the U.S. Cavalry
 - (c) by the settlers
 - (d) in the mountains of the west
7. The Indians were in reservations because
 - (a) then the Cavalry could watch over them more easily
 - (b) that was where there was good farmland for them
 - (c) that was where there were good hunting grounds for them
 - (d) they won the Indian Wars

8. When the Indians attacked a wagon train
 - (a) they always attacked on horseback
 - (b) it was usually a surprise attack
 - (c) they liked to attack on foot
 - (d) the settlers were usually ready for them
9. The covered wagons were
 - (a) slow moving and easy targets
 - (b) quite easy to defend against attacks
 - (c) pulled by fast horses, and often escaped from the attacking Indians
 - (d) difficult for the Indians to find
10. Life for the settlers in the new West
 - (a) was not successful, and many went home again
 - (b) very quickly became soft and easy
 - (c) was still hard and tough
 - (d) was rich and comfortable from the start

Part C: *Some of these sentences were in the passage you read. Some were not. Tick on the answer sheet to show which ones you read.*

1. The settlers crossed the Atlantic in slow old sailing ships.
2. The good flat land was by the coast.
3. There had been a shortage of land back home in Europe.
4. Very few people had yet moved to the West.
5. Some Indian tribes believed their gods lived in the empty lands.
6. The settlers had to find ways of travelling in groups.
7. The settlers' wagons were usually made of new pinewood.
8. Many of the families were very poor.
9. A lot of the settlers were families from countries in Southern Europe.
10. One of the fiercest tribes was the Apache tribe.
11. Many of the cavalrymen were newcomers to America.
12. The settlers fought as hard and savagely as they could against the Indians.
13. There was further fighting and bloodshed on both sides.
14. The wagons were slow and easy to follow.
15. Fort Laramie was one of the most famous forts.
16. The settlers had to take all the equipment, furniture, tools, food and cattle they would need.

17. The settlers had crossed an ocean then a continent to take what was not theirs.
18. Some of the toughest settlers were from the starving farms of Ireland.
19. Often the Indians caught the settlers by surprise, and unready to fight back.
20. The Indians wanted to turn back these white people who were stealing their lands.

Part A: *Some of the following statements are True (T), some are False (F), and for some there is Not Enough Evidence (NEE) to say if they are true or false. Tick the box on the answer sheet to show which each statement is.*

1. Fishing boats are safe even in the very worst winter weather.
2. The strong winds stop any ice forming on the topworks of the boats.
3. Bad weather is more common when the boats are on the way to the fishing grounds than on the way back.
4. The most dangerous thing for fishing boats is winter weather.
5. Radio aerials are often snapped off by the weight of ice.
6. Ice and freezing spray can make boats dangerously top-heavy.
7. Mines were laid in the last war by both the Germans and British.
8. The Germans usually laid mines from aircraft, while the British laid them from ships.
9. There is now a danger from drifting mines left over from the war.
10. All the mines laid in the last war were cleared away by minesweepers.
11. Although there was a fierce sea war, neither side used mines a lot.
12. Many of the mines were magnetic mines, set off by a ship's magnetism.
13. The fishermen will try to deal with the mine themselves if they can, to save money.
14. Fishermen who bring in a mine in their nets quickly ask for help.
15. The bomb disposal team will either blow the mine up or make it safe.
16. On a fishing boat, it is usually the skipper who works the radio.

17. The mine is never put back in the water and exploded, because that kills so many fish.
18. The bomb disposal officer can work on the mine only if the sea is fairly calm.
19. Nowadays, no-one is killed by mines.
20. Winter is the worst time for drifting mines.
21. Sometimes boats are sunk by mines before help arrives.

Part B: *Choose the best ending for each of these sentences. Put your answer on the answer sheet.*

1. The fishing grounds are
 - (a) always rough
 - (b) close to land
 - (c) far away
 - (d) in foreign water
2. The greatest winter danger is from
 - (a) the cold and the storms
 - (b) mines
 - (c) being blown up
 - (d) running aground
3. Mines were laid in the war
 - (a) by the Germans only
 - (b) to sink enemy ships
 - (c) to stop fishing boats
 - (d) by bomb disposal officers
4. When a boat catches a mine in its nets, the fishermen
 - (a) ask for help
 - (b) blow it up
 - (c) cut it free
 - (d) make it safe
5. The radio is used
 - (a) to warn other boats
 - (b) to send for the bomb disposal team
 - (c) to blow up the mine by radio control
 - (d) to listen for weather forecasts
6. The bomb disposal officer
 - (a) comes out by boat or helicopter
 - (b) is hardly ever needed
 - (c) works with a team of several men
 - (d) prefers to blow up the mine, instead of making it safe

7. To make a mine safe
 - (a) it has to be put back in the water
 - (b) it is returned to the sea and blown up
 - (c) the firing mechanism has to be taken out
 - (d) the firing mechanism is removed and it is blown up
8. Sometimes, the mine explodes
 - (a) while the fishermen are making it safe
 - (b) while the disposal team are working on it
 - (c) before the disposal team can get there
 - (d) while it is being laid
9. When a boat is missing
 - (a) the police come round to tell the families
 - (b) people hear about it when they listen to the news
 - (c) no-one is surprised, because it happens so often
 - (d) there is a search for wreckage or survivors
10. When a boat has been lost, fishermen
 - (a) sometimes give up the sea, because it is so dangerous
 - (b) stay in harbour for a while
 - (c) know that the bomb disposal team did their best
 - (d) continue to go to sea, despite the dangers

Part C: Some of these sentences were in the passage you read. Some were not. Tick on the answer sheet to show which ones you read.

1. The fishing boats are gaily painted and beautifully kept.
2. People did not go to the seaside for holidays in the war.
3. Much modern equipment in fishing boats is expensive, specially electronic equipment.
4. Quite often, a police boat or coastguard boat brings out the bomb disposal team.
5. The men in the Navy who deal with mines are called Clearance Divers.
6. The mine has been soaked and battered by the endlessly moving sea.
7. There would be no profit from the trip if they cut the nets away.
8. If it has been too badly damaged by the sea, taking out the firing mechanism is too dangerous.
9. Drifting mines are just one danger, and probably they have sunk many fishing boats.
10. Many fishing boats were built in east coast ports.

11. In gales, the wave tops break, and are whipped away.
12. There are dangers left from the last war.
13. Mines lurked below the sea's surface, an unseen and deadly menace.
14. As the net is hauled in, the mine is dragged towards the boat.
15. The little ship is torn apart by the explosion, and quickly sinks.
16. We might hear about a missing boat on the car radio, or read it in the papers.
17. Most fishing families have sent men to sea for generations and generations.
18. There are many foreign ships on the fishing grounds.
19. The bomb disposal experts need to get there as fast as possible.
20. Most fishermen work in four hour watches.

Blue test Answer Form

NAME: _____

BOY/ GIRL: _____

AGE: _____

GROUP 1/2: _____

Part A: Tick the box to show whether each statement was True (T), False (F), or Not Enough Evidence (NEE).

	T	F	NEE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

	T	F	NEE
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Part B: Tick to show which was the right ending for each sentence.

1.

a	
b	
c	
d	

2.

a	
b	
c	
d	

3.

a	
b	
c	
d	

4.

a	
b	
c	
d	

5.

a	
b	
c	
d	

6.

a	
b	
c	
d	

7.

a	
b	
c	
d	

8.

a	
b	
c	
d	

9.

a	
b	
c	
d	

10.

a	
b	
c	
d	

Part C: *Tick the boxes to show which sentences were in the passage you read.*

Statement 1	
Statement 2	
Statement 3	
Statement 4	
Statement 5	
Statement 6	
Statement 7	
Statement 8	
Statement 9	
Statement 10	

Statement 11	
Statement 12	
Statement 13	
Statement 14	
Statement 15	
Statement 16	
Statement 17	
Statement 18	
Statement 19	
Statement 20	

Red test Answer Form

NAME: _____

BOY/ GIRL: _____

AGE: _____

GROUP 1/2: _____

Part A: *Tick the box to show whether each statement was True (T), False (F), or Not Enough Evidence (NEE).*

	T	F	NEE
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

	T	F	NEE
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Part B: *Tick to show which was the right ending for each sentence.*

1.

a	
b	
c	
d	

2.

a	
b	
c	
d	

3.

a	
b	
c	
d	

4.

a	
b	
c	
d	

5.

a	
b	
c	
d	

6.

a	
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7.

a	
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8.

a	
b	
c	
d	

9.

a	
b	
c	
d	

10.

a	
b	
c	
d	

Part C: *Tick the boxes to show which sentences were in the passage you read.*

Statement 1	
Statement 2	
Statement 3	
Statement 4	
Statement 5	
Statement 6	
Statement 7	
Statement 8	
Statement 9	
Statement 10	

Statement 11	
Statement 12	
Statement 13	
Statement 14	
Statement 15	
Statement 16	
Statement 17	
Statement 18	
Statement 19	
Statement 20	

APPENDIX NINE.

**Experimental material from
Study Nine.**

The Kungu tribe live in the forest of Central Africa, near the River Congo. They live by hunting forest animals. They build their huts in clearings in the forest. They are pygmies, very small and tough people.

They are specially good as simple builders. They have very few buildings, and all their needs are simple ones. Everything they build is made from what grows in the forest. Their huts are made from leaves and long thin branches. More remarkable are the bridges that these tiny people build. They are hanging bridges, and are sometimes very long indeed. These long, light suspension bridges are known all over the world.

The Kungus are travelling people, always moving on to find food. Each day, their hunters may hunt many miles from camp. It is not easy travelling country. Apart from the jungle, there are many rushing rivers and deep valleys. The rivers are deep, and dangerous to cross. But the hunters must cross them. So they build bridges over them.



The bridge is built where the river is narrow. The valley sides should be steep and rocky. There should be strong trees at each side. Strong, thick vines are collected from the forest. They are cut to the right length, then left to dry in the sun. Then they are woven into ropes.

The first two ropes are pulled across the river by a swimmer. Both ends are then tied to suitable trees. This leaves the two ropes hanging side by side far above the river beneath. Short lengths of vine are then laid across them. These are long enough to hang down in deep loops. Starting from one side of the river, the loops are woven together, to make a kind of hanging web. It is dangerous work. Men sometimes fall from the vines.

But when it is finished, the bridge will be strong and long lasting. The web of thick vines makes a path through the sky above the river. It may stretch many hundreds of feet from bank to bank. But although it looks flimsy, it is remarkably strong and lasting. The web of sun dried vines will carry a surprising amount of weight. Several hunters can cross it at one time. Without their rope bridges, the Kungu tribesmen could not live in these forests.

The Tiny Hunters of the Jungle

Blue 2

The Kungu tribe live in the forest of Central Africa, near the River Congo. They live by hunting forest animals. They build their huts in clearings in the forest. They are pygmies, very small and tough people.

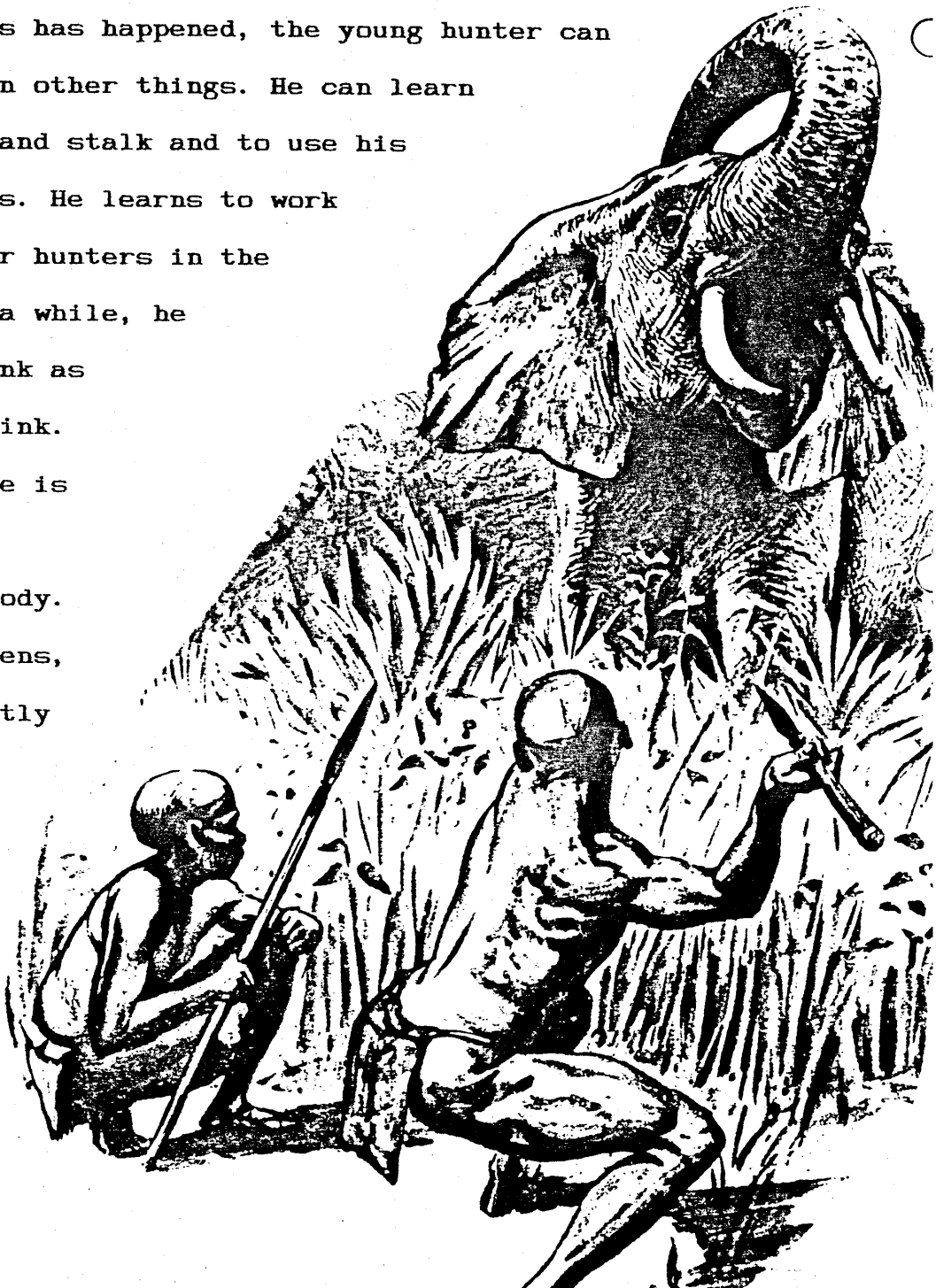
They live and work in family groups. In each group there are old and young people, men and women. They do everything together, working as a team at every task. Old and young, men and women, work together like a machine. They each know their part exactly, whatever they are doing. Hunting, building, travelling, cooking, each person has their own task. Without this trust and teamwork they could not survive very long.

Their lives are hard and dangerous, with death never far away. They survive only as a team. That way, they can hunt, and fight off their enemies. The Central African forest is full of dangers for these tiny people. Small though they are, they hunt wild elephants. They hunt as a perfect team. Each must trust the others completely.

They learn this trust and teamwork as they hunt. Each family group is a well tried team. Each youngster joins as soon as old enough. The child must be fit and strong enough. The new hunter does not need to be skilled with spear or hunting bow. That comes later, after much practice.

First, the youngster has to learn complete trust in the other hunters. Only then can he learn how to hunt. The Kungu hunters teach this trust to their new hunters in an unusual way. During the hunt, they deliberately put them into danger. The youngster suddenly finds himself alone, facing an elephant. Then, at the moment of greatest terror, the other hunters appear beside him, and the awful moment is gone. So he learns trust. He is part of a team.

Once this has happened, the young hunter can start to learn other things. He can learn how to track and stalk and to use his simple weapons. He learns to work with the other hunters in the group. After a while, he learns to think as the others think. It is as if he is just one part of a single body. Whatever happens, he knows exactly what to do. It is only because of this trust and teamwork that they can survive.



The Potol Warriors of Central America

Red 1

Five hundred years ago, the Potols were the most powerful people in Central America. They were rich and well organised. Their great city was built out into a lake. They were brilliant people, but cruel and hard.

The Potols were strong, fearless and tough. They were known widely for the way they always obeyed their leaders. Among the Potols, obeying orders was the most important quality. Every night, a hundred victims were sacrificed to the gods. No guards were needed to take the victims to their deaths. They thought it was an honour to die that way. They were taught from early childhood to obey orders without question.

The Potol kings always kept huge armies in readiness to fight. Their strong armies conquered and controlled all the nearby tribes. Sometimes they were used at home. Potol kings were always ready to crush rebels among their own people. Armies need soldiers who are obedient. Soldiers are often told to do terrible things. They must do them without question.

The Potols trained their boys from an early age. They learned that they must obey every order. Children were punished cruelly for any small thing. They learned to fear people who gave orders. Very quickly, Potol children found out that only fools hesitated, or questioned an order. The punishments were savage and immediate.

If a boy was rude or lazy or dishonest, he was beaten. That happened often, and few boys escaped it. The special punishments were kept for boys who were slow to obey an order. Sometimes they had cactus spines pushed into their hands. Sometimes their hair was hacked off with a blunt knife. Or perhaps they were held over a fire, or tied up and left out in the jungle all night. Often children died as a result. But the system worked.



By the time a Potol boy came to manhood, he never asked questions. He did exactly what he was told to do, and he did it quickly. This way the King knew he could trust his soldiers completely. They were men who did not want to disobey an order. More important, they had become men who did not know how to disobey. Because of their childhood training, they had become human machines, men without feelings. This was just what the Potol kings wanted.



Five hundred years ago, the Potols were the most powerful people in Central America. They were rich and well organised. Their great city was built out into a lake. They were brilliant people, but cruel and hard.

Potols were great engineers, artists and craftsmen. They were known far and wide for the beautiful things they made. They made many lovely buildings, jewels, pictures, carvings and clothes. They were famous for all the fine things they made. People travelled from afar to buy things made by the Potols. Most famous was the patterned and dyed cloth they wove. Their young women were taught to weave this brightly coloured material.

Only chiefs and nobles were allowed to wear brightly coloured clothes. So fabrics with bright designs and colours were greatly valued. They were a sign of importance. If a Potal wore bright clothes, he was a person of rank. Other people were not allowed to wear them. But still they wanted the cloth. It made fine rugs and hangings. There was a special



weaving school in the city. Girls could go there when they were fifteen. They stayed there for two or three years. The girls learned all about cloth and weaving. They learned about the looms, the cottons, the wools, the threads and the dyes. They learned both spinning and weaving.

Wool, cotton and various dyes were brought into the city by packhorse. The weaving loom would be set up carefully. The cotton thread was dyed and set up on the loom for each pattern. Then the girls worked in twos, as a team. One spun the wool, while the other worked the loom. The colouring, with bright designs of of coloured dyes, was painted on later, once the cloth had been woven. It was difficult work. But the results were very beautiful.

The finished pieces came in very many different shapes and sizes and colours. There were many different patterns and designs, for clothes and rugs and wall coverings. Designs for clothes were usually simple, with two or three colours. Rugs and wall hangings were different, with flower and animal designs. They were so well made that they did not lose shape or colour. Some of these beautiful fabrics have been found in tombs of Potol kings. They had lost none of their brilliant colour.

Test for "The Crafts
of the Potols"

Red 2

PART 1: Write the answers to these questions on your answer sheet.

1. What were the Potols most famous for making?
2. Why did the Potol people like this so much
3. Where did they learn to make this?
4. How many girls were in each team?
5. How were the patterns done?
6. What different things were the finished pieces used for?

PART 2: Imagine you are talking to someone who has not read this passage. You want them to know all the important things in it. Write a paragraph on your answer sheet to show what you would say.

Test for "The Tiny Hunters
of the Jungle"

Blue 2

PART 1: Write the answers to these questions on your answer sheet.

1. What was special about the way the Kungu worked with each other?
2. Why was it important that they worked this way?
3. Where did they learn to work this way?
4. What was the first thing the youngsters had to learn as hunters?
5. What was unusual about the way they were taught it?
6. What do they learn next, after they have learned this first thing?

PART 2: Imagine you are talking to someone who has not read this passage. You want them to know all the important things in it. Write a paragraph on your answer sheet to show what you would say.

Test for "The Potol Warriors
of Central America" Red 1

PART 1: Write the answers to these questions on your answer sheet.

1. What were the Potols taught from early childhood
2. Why was it so important that the Potols were taught this?
3. What did Potol boys quickly find out?
4. What was one of the special punishments given to Potol boys?
5. What particular wrongdoing was punished in this way?
6. In what way were Potol soldiers like machines?

PART 2: Imagine you are talking to someone who has not read this passage. You want them to know all the important things in it. Write a paragraph on your answer sheet to show what you would say.

PART 1: Write the answers to these questions on your answer sheet.

1. What were the Kungus famous for making
2. Why did the Kungus need to make these things?
3. What did they use to make them?
4. What is the first thing that has to be done when making one of these?
5. What is done next?
6. How do you know they are strong?

PART 2: Imagine you are talking to someone who has not read this passage. You want them to know all the important things in it. Write a paragraph on your answer sheet to show what you would say.

Answer form for "The Tiny Hunters of the Jungle"

Blue 2

NAME: _____ BOY/ GIRL: _____

AGE: _____ GROUP 1/2: _____

PART 1: Write your answers in these spaces:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

PART 2: Write your paragraph here:

APPENDIX TEN.

**Experimental material from
Study Ten.**

"Samson Creek: a market town in the new west."

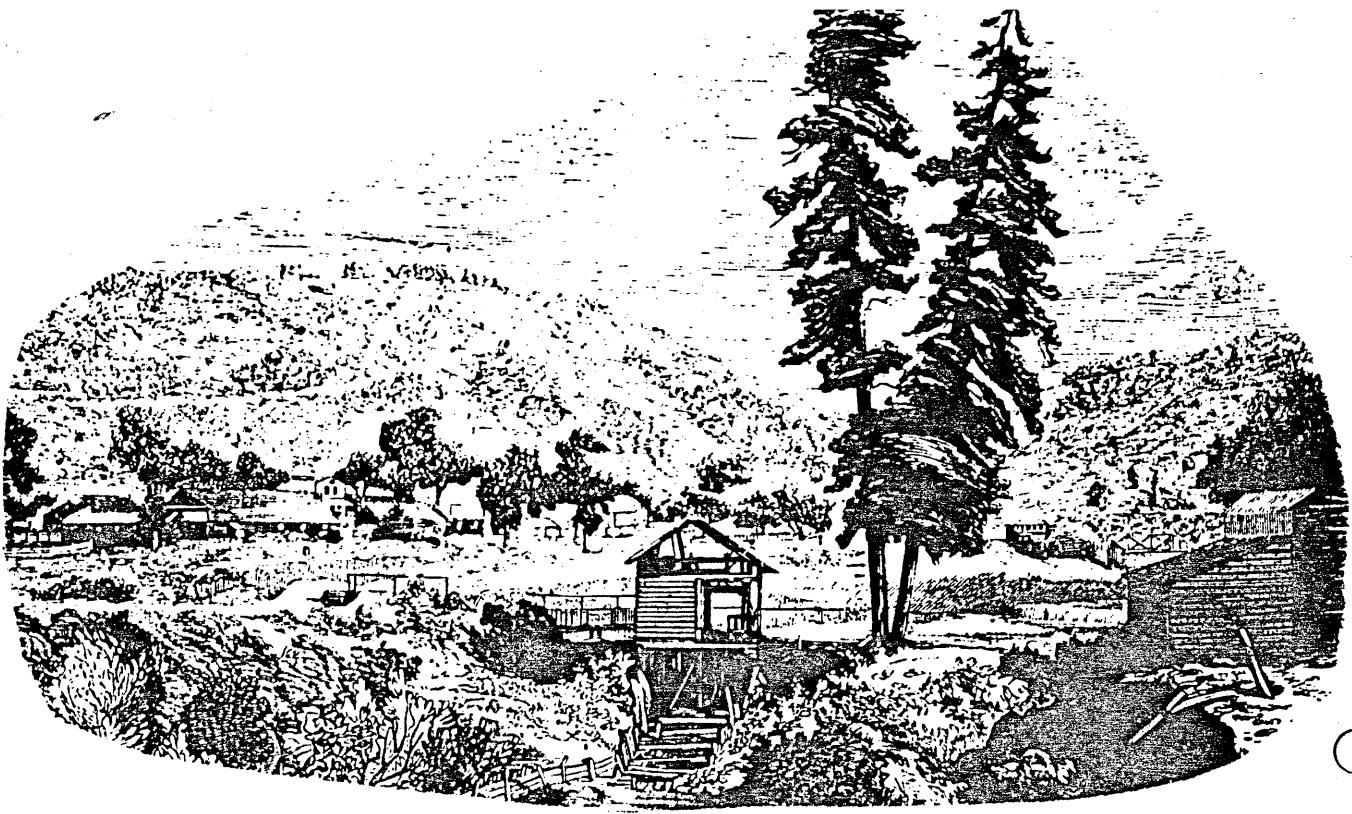
Red 2

Samson Creek today is a bustling town of twenty thousand people. It stands at the bottom of the Samson Valley in California. Only a hundred years ago the valley was empty. The Samson River wound through the valley bottom. The land by the river was thickly wooded, mainly with pine, oak and beech. Higher up, away from the river, there was rolling grassland. The whole valley was sheltered by the surrounding hills.

There were a number of reasons why the town grew up where it did. The south facing valley got a lot of sunshine. The summers were a little longer than in the surrounding country. It was well watered, from the Samson River flowing along the valley bottom. There was regular warm rainfall as the moist Pacific air lifted over the hills. The warmth and the plentiful supply of water gave a perfect climate for farming.

The earth in the valley bottom was a thick, dark loam. It was rich and crumbly, and full of goodness. It was sandy enough to be well drained, so that the fields did not flood. At the same time, it held enough water to stay damp and moist through the hot summers. The richness and the dampness of the soil made it excellent for growing fruit, vegetables and cereals.

The wagon trains that wound their way westwards in the last century were full of farming folk. They were looking for new farmlands, less crowded than those they had left behind. When



they first came to Samson Valley, they noticed immediately the flat lands in the valley bottom. Such flat country would be easier to farm than the steeper landscape they had passed through so far. The mixture of families looking for farmland, and the miles of empty flat lands, meant that the valley was soon dotted with new farms.

The river was fairly deep for most of its way down the valley. Shallow boats could use it to carry small cargoes. The open grasslands made easy travelling on horseback and by wagon. Very soon, the valley was criss-crossed by tracks and roadways. With the river and the roads, transport was good, and it was easy for farmers to get their goods to market.

The combination of a fine climate, good soil, plenty of farms, and good transport meant that a market town soon grew up on the banks of the Samson River. It grew quickly as the years went by.

Today, as well as the markets, it has many factories and industries that serve the farming community. It is a good example of the way a market town can grow.

"Fort Judge: an army camp on the Oregon trail"

Blue 2

Army camps were placed where they were for many reasons. Certain things had to happen if a camp or fort was to be built. For example, in the Indian Wars the army had to protect the settlers from the Indians. A fort in Indian country made sense. If it was to last, it had to be in a good defensive position, to survive the Indian attacks. Lastly, it had to have enough food and water to hold out for a long time. With all this, the camp or fort might last a long time, and grow big.

One hundred and twenty years ago Fort Judge did not exist. Nothing disturbed the empty hillsides by the Red River. Today, there is a large army camp and a busy town. Before the camp, it was very empty country. The only people were the Sioux Indians, scattered about the area in small groups. There was just the Indians, the river, and the hills. Apart from small Indian camps, the country was deserted.

There were a number of reasons why the camp and town grew up there. These hills were the homelands of the Sioux Indians. They had been their hunting grounds for many hundreds of years. Then the white settlers came, passing through in their wagon trains. Most moved on through, but some stayed, and the Sioux hated these white men. Again and again the Indians attacked the settlers' wagon trains, killing these hated invaders.

The U.S. Army was called in, and the Indian Wars started. After years of bloody fighting, the Indians were beaten. The government made the defeated Indians live in special areas, where they could be guarded. These special guarded areas were called reservations, and all the defeated Indians had to live in them. The Army built a camp, Fort Judge, near the Sioux reservation, to watch over the defeated tribes.



In front of the fort was open hillside and grassland, sloping away to woodland in the distance. There was no way attackers could approach without being seen by the soldiers inside. At the back of the fort, the Red River thundered its way down down rapids and waterfalls. The river could not be crossed anywhere for ten miles upstream or downstream from the newly built fort. The river behind, and the open land in front, meant that Fort Judge would not be surprised by attackers, and could be well defended.

The back of the fort was right against the bank of the river. There was plenty of fresh water for the soldiers. There were large caves on the riverbank, always cool and damp. These

made good storerooms for large reserves of food supplies. With fresh water and plenty of food, the soldiers often held out for months against the Indian attacks that sometimes came.

Because the Indian troubles continued, and because the fort was close to the reservation, could be easily defended, and hold out a long time, Fort Judge was specially important. Quite soon it became a big army base.

Today the Indians have gone, but the large camp, now with homes, shops and schools, has grown. It shows how towns can outlive the reasons that once started them growing.

"Samson Creek: a market town in the new west."

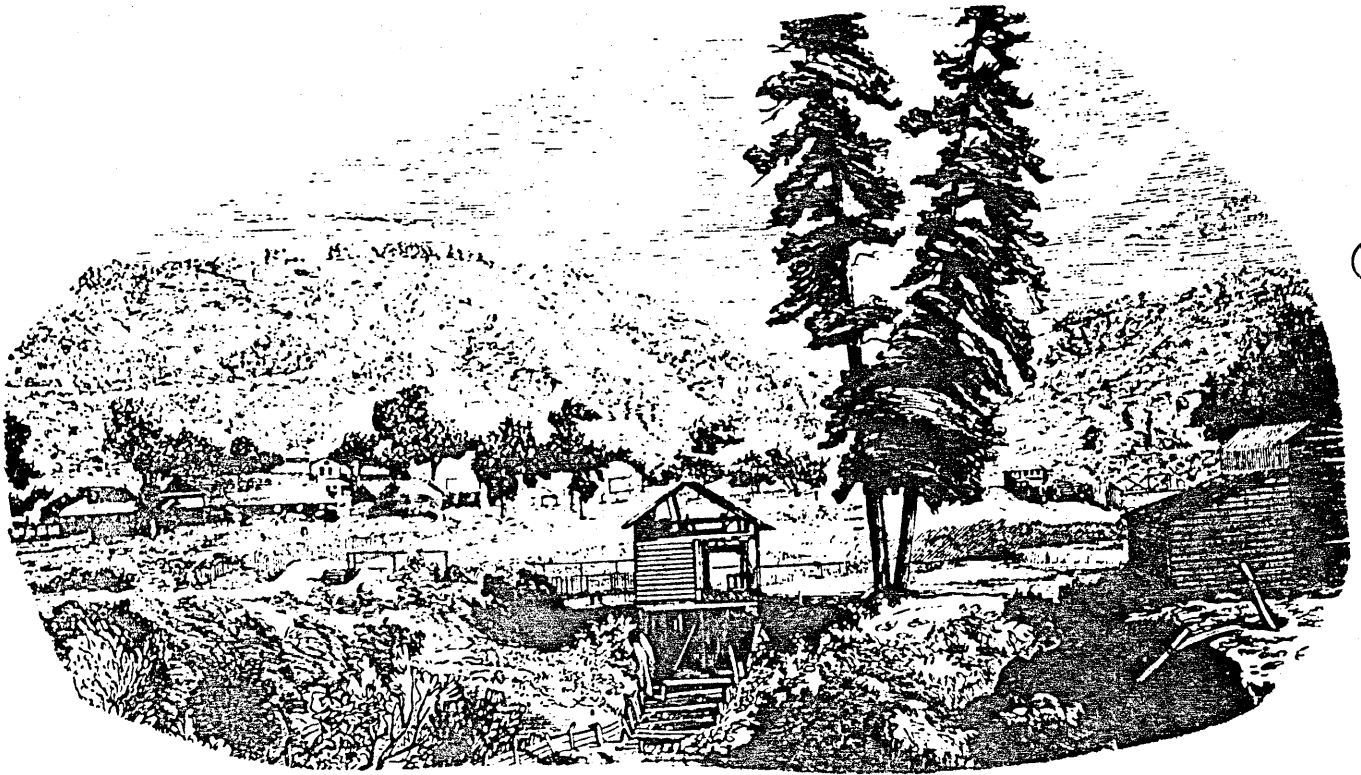
Red 1

Towns grow where they do for a number of reasons. For example, four things must combine if a market town is to grow well. First, there must be the kind of climate and weather that allows crops to do well. Second, the crops need good, rich soil. Thirdly, the farms: good climate and good soil mean there will be a lot of farms in the area. Fourthly, there must be good transport, so that the farmers can get their produce to market. If those four things are there, it is likely that a market town will grow.

Samson Creek today is a bustling town of twenty thousand people. It stands at the bottom of the Samson Valley in California. Only a hundred years ago the valley was empty. The Samson River wound through the valley bottom. The land by the river was thickly wooded, mainly with pine, oak and beech. Higher up, away from the river, there was rolling grassland. The whole valley was sheltered by the surrounding hills.

There were a number of reasons why the town grew up where it did. The south facing valley got a lot of sunshine. The summers were a little longer than in the surrounding country. It was well watered, from the Samson River flowing along the valley bottom. There was regular warm rainfall as the moist Pacific air lifted over the hills. The warmth and the plentiful supply of water gave a perfect climate for farming.

The earth in the valley bottom was a thick, dark loam. It was rich and crumbly, and full of goodness. It was sandy enough to be well drained, so that the fields did not flood. At the same time, it held enough water to stay damp and moist through the hot summers. The richness and the dampness of the soil made it excellent for growing fruit, vegetables and cereals.



The wagon trains that wound their way westwards in the last century were full of farming folk. They were looking for new farmlands, less crowded than those they had left behind. When they first came to Samson Valley, they noticed immediately the flat lands in the valley bottom. Such flat country would be easier to farm than the steeper landscape they had passed through so far. The mixture of families looking for farmland, and the miles of empty flat lands, meant that the valley was soon dotted with new farms.

The river was fairly deep for most of its way down the valley. Shallow boats could use it to carry small cargoes. The

open grasslands made easy travelling on horseback and by wagon. Very soon, the valley was criss-crossed by tracks and roadways. With the river and the roads, transport was good, and it was easy for farmers to get their goods to market.

The combination of a fine climate, good soil, plenty of farms, and good transport meant that a market town soon grew up on the banks of the Samson River. It grew quickly as the years went by.

Today, as well as the markets, it has many factories and industries that serve the farming community. It is a good example of the way a market town can grow.

"Fort Judge: an army camp on the Oregon trail"

Blue 1

One hundred and twenty years ago Fort Judge did not exist. Nothing disturbed the empty hillsides by the Red River. Today, there is a large army camp and a busy town. Before the camp, it was very empty country. The only people were the Sioux Indians, scattered about the area in small groups. There was just the Indians, the river, and the hills. Apart from small Indian camps, the country was deserted.

There were a number of reasons why the camp and town grew up there. These hills were the homelands of the Sioux Indians. They had been their hunting grounds for many hundreds of years. Then the white settlers came, passing through in their wagon trains. Most moved on through, but some stayed, and the Sioux hated these white men. Again and again the Indians attacked the settlers' wagon trains, killing these hated invaders.



The U.S. Army was called in, and the Indian Wars started. After years of bloody fighting, the Indians were beaten. The government made the defeated Indians live in special areas, where they could be guarded. These special guarded areas were called reservations, and all the defeated Indians had to live in them. The Army built a camp, Fort Judge, near the Sioux reservation, to watch over the defeated tribes.

In front of the fort was open hillside and grassland, sloping away to woodland in the distance. There was no way attackers could approach without being seen by the soldiers inside. At the back of the fort, the Red River thundered its way down down rapids and waterfalls. The river could not be crossed anywhere for ten miles upstream or downstream from the newly built fort. The river behind, and the open land in front, meant that Fort Judge would not be surprised by attackers, and could be well defended.

The back of the fort was right against the bank of the river. There was plenty of fresh water for the soldiers. There were large caves on the riverbank, always cool and damp. These made good storerooms for large reserves of food supplies. With fresh water and plenty of food, the soldiers often held out for months against the Indian attacks that sometimes came.

Because the Indian troubles continued, and because the fort was close to the reservation, could be easily defended, and hold out a long time, Fort Judge was specially important. Quite soon it became a big army base.

Today the Indians have gone, but the large camp, now with homes, shops and schools, has grown. It shows how towns can outlive the reasons that once started them growing.

Blue test: "Fort Judge: an Army Camp
on the Oregon Trail"

Tick the box on the answer sheet to show which is the right ending for each of these sentences.

1. The hills where Fort Judge was built
 - (a) were a long way from the rapids and waterfalls of the Red River
 - (b) were the homelands of the Sioux Indians.
 - (c) were hated by the white settlers, as they passed through in their wagon trains.
 - (d) had always been crowded with hunters and travellers.
2. These hills
 - (a) had never been used by white settlers or the Sioux.
 - (b) had been filled with large Indian camps for hundreds of years.
 - (c) had long been used by small groups of Indians from many different tribes.
 - (d) had been the Sioux hunting grounds for a long time.
3. The white settlers came,
 - (a) again and again attacking and killing the Sioux Indians.
 - (b) many of them men who hated Indians, specially the Sioux.
 - (c) most of them settling in these Sioux homelands.
 - (d) travelling through the area in their wagon trains.
4. Most of the settlers
 - (a) did not stay, but moved on through.
 - (b) stayed and settled in the Sioux homelands.
 - (c) did not like the open hillsides and grasslands near the Red River
 - (d) did not want the Army called in to fight the Sioux.
5. The Indians attacked the newcomers because
 - (a) the newcomers had attacked their reservations.
 - (b) they were invading their homelands.
 - (c) they thought the newcomers would upset their tribal gods.
 - (d) the Army built a fort in their homelands.
6. The Indian Wars started
 - (a) when the Sioux attacked Fort Judge
 - (b) because the settlers murdered the Indians and burned their camps.
 - (c) when the Army was called in to protect the settlers.
 - (d) when the defeated Indians were made to live in special guarded areas called reservations.
7. After the fighting had gone on for years
 - (a) there was a great battle in the empty hills by the Red River.
 - (b) the Indians were beaten by the Army.
 - (c) the Army attacked the Indian reservations.
 - (d) the Army were defeated.

8. The Indians were made to live in special areas
 - (a) far away from the hated white men.
 - (b) well away from all other Indian tribes.
 - (c) so that they could be watched and guarded.
 - (d) where there was plenty of fresh water and storerooms for food supplies.
9. The places where the defeated Indians were forced to live were
 - (a) known as reservations.
 - (b) very bad hunting grounds.
 - (c) far away from the white settlers and their wagon trains.
 - (d) very close to the waterfalls and rapids of the Red River.
10. So that the Army could watch over the defeated Sioux
 - (a) they made them live in very small camps.
 - (b) they drove all the other tribes out of the area.
 - (c) they built a camp near the reservation.
 - (d) they scattered them about in small groups.
11. In front of the fort
 - (a) there was a crowded Sioux camp.
 - (b) there were a number of large caves.
 - (c) there was open, grassy hillside.
 - (d) there were storerooms for food.
12. Any attackers approaching the fort
 - (a) would be seen by the defending soldiers.
 - (b) would have to pass through special guarded area called reservations.
 - (c) would have to cross the rapids and waterfalls of the Red River.
 - (d) would have to climb steep, rocky cliffs.
13. Behind the fort
 - (a) the river could be crossed anywhere within ten miles upstream or downstream.
 - (b) the river was wild and fast-moving.
 - (c) was a special area where the Indians could be guarded.
 - (d) the ground was very dry and sandy.
14. The river each side of the fort
 - (a) was too fast moving and wild to be crossed.
 - (b) was quiet, shallow and slow moving.
 - (c) was where the Indians attacked the hated settlers.
 - (d) was surrounded by small Indian camps.
15. Fort Judge could not be surprised by attackers because
 - (a) its back was protected by the river, and there was open land in front.
 - (b) they would make a lot of noise crossing the river.
 - (c) after years of bloody fighting, the Indian tribes had been beaten.
 - (d) there was plenty of fresh water and food for the defending soldiers.

16. The back of the fort
- (a) looked onto grassland and distant woodland
 - (b) had high wooden walls and watchtowers.
 - (c) was close against the river bank.
 - (d) overlooked a special guarded area, called a reservation.
17. The soldiers always had
- (a) a large camp, with homes, shops and schools.
 - (b) good hunting in the distant woodlands.
 - (c) a good supply of fresh meat from the Indian camps.
 - (d) plenty of fresh water.
18. The large caves on the riverbank
- (a) were specially guarded areas for the defeated Indians.
 - (b) were often flooded by the thundering rapids and waterfalls.
 - (c) were hot and dry in the summer months.
 - (d) were always cool and damp.
19. The riverside caves were used
- (a) to provide fresh water.
 - (b) to stop attackers crossing the river.
 - (c) as storerooms for food.
 - (d) as summer living quarters for the soldiers.
20. The fort could hold out for months because
- (a) there was plenty of fresh water and food.
 - (b) supplies could be brought in by river.
 - (c) the Indians were all in special guarded areas called reservations.
 - (d) attackers could not approach without being seen.
21. Fort Judge was specially important because
- (a) at last the Indians have gone, and it has become a large camp with homes, shops and schools.
 - (b) all through the long Indian troubles it was close to the reservation, it could hold out a long time, and it was easy to defend.
 - (c) it was the last of the big Army camps before the wagon trains crossed the empty mountains and deserts.
 - (d) the empty hillsides by the Red River had never been disturbed before the U.S. Army was called in.

Red test: "Samson Creek: a Market
Town in the New West"

Tick the box on the answer sheet to show which is the right ending for each of these sentences.

1. The valley got a lot of sunshine because
 - (a) it was sheltered by surrounding hills.
 - (b) it faced towards the south.
 - (c) it was a perfect climate for farming
 - (d) there were only a few trees to give shade.
2. Because of the sunshine
 - (a) the summer season was unusually long.
 - (b) parts of the valley were too hot for farming.
 - (c) the valley bottom was well watered.
 - (d) there was regular rainfall.
3. Some of the water that the farmers needed
 - (a) came from the river.
 - (b) could be found in the high grassland away from the river.
 - (c) had to be taken from deep wells.
 - (d) was there because it was a south facing valley.
4. Rainfall in the valley
 - (a) came mainly in the winter months.
 - (b) was warm and regular.
 - (c) was not regular because of the surrounding hills.
 - (d) was rare because the Pacific air was not moist enough.
5. The climate was good for farming because
 - (a) there were pine, oak and beech woodlands.
 - (b) it was warm and dry.
 - (c) the Smason River wound through the valley bottom.
 - (d) the valley was warm and well watered
6. The earth in the valley bottom was
 - (a) not so good in the grasslands away from the river
 - (b) a thick, dark kind called loam.
 - (c) particularly good in the wooded land by the river.
 - (d) dry and thin.
7. The soil was
 - (a) too dry and sandy.
 - (b) often flooded by rain as the moist Pacific air lifted over the hills.
 - (c) good and rich.
 - (d) crumbly and full of goodness, but far too dry in many places.
8. Because the soil was fairly sandy
 - (a) the fields flooded easily.
 - (b) it was well watered, specially by the river.
 - (c) it was well drained.
 - (d) there were parts of the valley where farming was difficult.

9. In the long, hot summers, the soil
 - (a) dried out on the higher grasslands.
 - (b) stayed moist, rich and crumbly only by the river.
 - (c) dried out everywhere in the valley.
 - (d) stayed damp and moist enough for farming.
10. The soil was good for farming because
 - (a) it was both rich and damp.
 - (b) it was thin, dry and very sandy.
 - (c) fruit, vegetables and cereals need fairly dry soil.
 - (d) it stayed dry through the hot summers.
11. The people who made their way westwards
 - (a) did not always stay long.
 - (b) were good boatmen, well able to use the river.
 - (c) were farming folk, travelling west by wagon train.
 - (d) were mostly traders, anxious to settle in a market town.
12. The new arrivals at Samson Valley
 - (a) cleared away the pine, oak and beech forest by the river.
 - (b) were looking for new, empty farmland.
 - (c) settled first on the high grassland away from the river.
 - (d) found it very hard in the early years.
13. The first thing the newcomers noticed was
 - (a) the flatness of the valley bottom.
 - (b) the criss-crossing roadways already in the valley.
 - (c) The rapids of the fast flowing river.
 - (d) the way the woodlands were close beside the river.
14. The country of Samson Valley would be easy to farm because
 - (a) it was empty.
 - (b) it was flat.
 - (c) it had not been farmed before.
 - (d) it was open grassland.
15. The valley was soon dotted with new farms because
 - (a) there was a market town nearby.
 - (b) there were plenty of roads and tracks.
 - (c) the new arrivals were farming folk, looking for such good, empty farmland.
 - (d) land was very cheap in the Samson Valley.
16. The Samson River
 - (a) flowed westwards towards the Pacific.
 - (b) was quite deep for most of its length.
 - (c) was shallow and fast flowing.
 - (d) could be crossed on horseback in several places.
17. Shallow boats used the river
 - (a) to ferry horsemen and wagons up and down the valley.
 - (b) for hunting trips among the pine, oak and beech woods.
 - (c) to bring in timber to build the new farms.
 - (d) to carry goods from farm to market

18. Travelling by wagon or on horseback
- (a) was difficult because of the wet, sandy soil.
 - (b) was only possible in the summer season.
 - (c) was difficult because of the way the Samson River wound through the valley bottom.
 - (d) was easy because of the open grasslands.
19. Tracks and roadways
- (a) were soon criss-crossing all over the valley bottom.
 - (b) criss-crossed the steep landscape that the newcomers had passed through.
 - (c) were few and far between in the thick forest of the valley bottom.
 - (d) were often flooded by the regular warm rainfall from the moist Pacific air.
20. It was easy for farmers to get their goods to market because
- (a) the summers were a little longer than in the surrounding country.
 - (b) every day was market day in Samson Creek.
 - (c) both the river and the roads could be used for transport.
 - (d) the farmlands were less crowded than those they had left behind.
21. The market town grew because of the combination of
- (a) the long dry summers and the shallow river.
 - (b) good climate, good soil, plenty of farms and good transport.
 - (c) steep landscape, sandy soil, and woodlands of pine, oak and beech.
 - (d) the good soil and the difficulties of transporting goods out of the valley.

Red test Answer Form:

Samson Creek: a Market Town
in the New West.

NAME: _____

GROUP 1/ 2: _____

AGE: _____

BOY/ GIRL: _____

1.

a	
b	
c	
d	

2.

a	
b	
c	
d	

3.

a	
b	
c	
d	

4.

a	
b	
c	
d	

5.

a	
b	
c	
d	

6.

a	
b	
c	
d	

7.

a	
b	
c	
d	

8.

a	
b	
c	
d	

9.

a	
b	
c	
d	

10.

a	
b	
c	
d	

11.

a	
b	
c	
d	

12.

a	
b	
c	
d	

13.

a	
b	
c	
d	

14.

a	
b	
c	
d	

15.

a	
b	
c	
d	

16.

a	
b	
c	
d	

17.

a	
b	
c	
d	

18.

a	
b	
c	
d	

19.

a	
b	
c	
d	

20.

a	
b	
c	
d	

21.

a	
b	
c	
d	

Blue test Answer Form:

Fort Judge: an Army Camp
on the Oregon Trail

NAME: _____

GROUP 1/ 2: _____

AGE: _____

BOY/ GIRL: _____

1.

a	
b	
c	
d	

2.

a	
b	
c	
d	

3.

a	
b	
c	
d	

4.

a	
b	
c	
d	

5.

a	
b	
c	
d	

6.

a	
b	
c	
d	

7.

a	
b	
c	
d	

8.

a	
b	
c	
d	

9.

a	
b	
c	
d	

10.

a	
b	
c	
d	

11.

a	
b	
c	
d	

12.

a	
b	
c	
d	

13.

a	
b	
c	
d	

14.

a	
b	
c	
d	

15.

a	
b	
c	
d	

16.

a	
b	
c	
d	

17.

a	
b	
c	
d	

18.

a	
b	
c	
d	

19.

a	
b	
c	
d	

20.




a	
b	
c	
d	

21.

a	
b	
c	
d	










































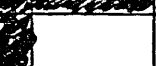











APPENDIX ELEVEN.

**The Cognitive Demands of
Different Assessment
Techniques.**

Key: No significant demand 
 Some demand 
 Significant demand 

ASSESSMENT
TECHNIQUES

COGNITIVE DEMANDS MADE

	Search/ retrieval	Working memory	Matching meanings	Application	Examiner expectation	Production	Global comprehension	non-verbal aptitude	
True/ false									mainly matching, with limited demand on working memory
True/ false/ not enough evidence									mainly matching, with limited demand on working memory
Multiple choice; choice of single option									mainly matching, with limited demand on working memory
multiple choice; confidence ratings									matching, with significant demand on working memory
Summary identification									matching and working memory, demanding global comprehension
Diagram recognition									mainly matching, with limited demand on working memory, and non-verbal aptitude,
Sequencing/ ranking, by stated criteria									working memory and global comprehension
Sentence linking									mainly matching, with limited demand on working memory
Closed cloze									mainly matching
Open cloze									mainly matching, with limited demand on working memory and production skills
Discourse cloze									mainly matching, demanding a global grasp, with limited demand on working memory
Short answer questions									some search and retrieval, and awareness examiner expectations, with limited production skills
Sentence completion									some search and retrieval, and awareness examiner expectations, with limited production skills
Diagram completion									some search and retrieval, and global comprehension depending on the nature of the diagram, Production skills, non-verbal aptitude, and awareness of examiner expectations,
Table completion									search and retrieval, with production skills and some awareness of examiner expectations, Global grasp, depending upon contents of table,
Editing/ commenting upon errors									matching presented and stored meanings in the working memory, and some production
Unstructured free recall									Finding and producing the content, and awareness of examiner expectations
Summarising for the benefit of another									retrieving material, organising it in the working memory according to perceived listener demands; production skills and global comprehension

APPENDIX TWELVE.

**Sample Administration
Instructions.**

Study 4

Giving the tests - notes for teachers

Aim:

These tests are part of some research into why children who read stories well enough may still find factual writing difficult to learn from.

Preparing the class:

Divide the class into two groups, Group 1 and Group 2. Try to arrange them so that boys and girls are spread fairly equally between the two groups, also the good and poor readers.

If possible, spread the children about, to discourage them from helping each other.

Giving the tests:

The passages are numbered 1 or 2, and colour-coded Red or Blue.

Group 1 read Red 1, followed by the Red test, and Blue 1, followed by the Blue test.

Group 2 read Red 2, followed by the Red test, and Blue 2, followed by the Blue test.

When giving Group 1 their passages, give the first child Red 1, the next child Blue 1, and so on. Do the same with Group 2, alternating Red 2 and Blue 2 as you hand them out. This means a pupil will not be doing the same passage as his or her neighbour.

Because the research is exploring the kind of mental picture readers build up during normal reading, pupils may not look at the passage during the test. They must hand in the passage before they collect the test. They do the Red test after a Red passage, and the Blue test after a blue passage.

So the pattern for each pupil is:

- get the first passage, and read it
- hand it in
- get the first test, and do it
- hand it in
- get the second passage, and read it
- hand it in
- get the second test and do it
- hand it in

An answer form is provided for each test, for the pupils answers. They should not write on the question sheets.

IMPORTANT: Please check the details are filled in at the top of each answer sheet, giving name, sex, age and group.

Read this notice to the pupils before they start:

"These tests are to help us find out more about how children read. Your class is helping. It doesn't matter if you find it hard. Just do the best you can.

You will each read two passages, and do two tests.

You will be given your first passage to read. Read it carefully, twice if you want to.

You cannot look at the passage while you do the test. So when you have read the passage, give it back to the teacher, and get the test.

Write the answers on the answer sheet. Hand it in with the questions when you've finished, and get your second passage. Read it, hand it back, and then do the test for that passage.

Please keep as quiet as possible, and don't get help from your friends. That would spoil the experiment.

Most pupils will be able to finish both passages and tests within an hour or so. Pupils should have with them something to do when they are finished.

Thank you for your help! Please let me know if you have any ideas about how better to administer these tests. Your ideas would be very welcome.

APPENDIX THIRTEEN.

**The Experimental Material
Used in Stage Two.**

THE HERDSMEN OF THE MOUNTAINS

The Durki live in the Elburz mountains. They are sheep herders and hunters. They move on from place to place. In many ways, they live as they did hundreds of years ago.

SIMPLER ELEMENTS

ELEMENT 1 (text density: high level of supporting detail)

- | | |
|-------------|--|
| macroprop | In summer, it is good to be outside in the fine evenings. (12) |
| microprop 1 | The evenings are long and light. (6) |
| microprop 2 | There is a soft wind and warm sunshine. (8) |
| microprop 3 | There is a smell of flowers. (6) |
| microprop 4 | The grass is dry to sit on. (7) |
| macroprop | Families stay outside their tents until dark. (7) |
| microprop 1 | The women cook the evening meal outside, on open fires. (10) |
| microprop 2 | People eat and children play in front of their tents. (10) |
| microprop 3 | They go from tent to tent, visiting their friends. (9) |
| microprop 4 | Evening meetings are held outside. (5) |

In summer, it is good to be outside in the fine evenings. The evenings are long and light. There is a soft wind and warm sunshine. There is a smell of flowers. The grass is dry to sit on. Families stay outside their tents until dark. The women cook the evening meal outside, on open fires. People eat and children play in front of their tents. They go from tent to tent, visiting their friends. Evening meetings are held outside.

ELEMENT 2 (text density: low level of supporting detail)

- | | |
|-------------|--|
| macroprop | In winter, no-one wants to be outside in the cold, dark evenings. (12) |
| microprop 1 | The evenings are cold and dark. (6) |
| microprop 2 | There is no light outside to see by. (8) |
| microprop 3 | Darkness comes early in the evening. (6) |
| microprop 4 | It gets cold as it gets dark. (7) |
| macroprop | Families spend the evenings in their tents. (7) |
| microprop 1 | Most people want to be inside, out of the cold. (10) |
| microprop 2 | People need warmth and they need light in the evenings. (10) |
| microprop 3 | There is light to see by in the tents. (9) |
| microprop 4 | Also, it is warm inside. (5) |

In winter, no-one wants to be outside in the cold, dark evenings. The evenings are cold and dark. There is no light outside to see by. Darkness comes early in the evening. It gets cold as it gets dark. Families spend the evenings in their tents. Most people want to be inside, out of the cold. People need warmth and they need light in the evenings. There is light to see by in the tents. Also, it is warm inside.

ELEMENT 3 (deductive paragraph organisation)

- macroprop The Durki do not like the valleys in summer. (9)
microprop 1 There are many flies and insects. (6)
microprop 2 People and sheep get ill in the valleys in summer. (10)
microprop 3 The rich summer grass is bad for sheep. (8)
microprop 4 It is much too hot. (5)
- macroprop The Durki like to have their summer camps in the mountains. (11)
microprop 1 Hunting is good on the high ground. (7)
microprop 2 It is more cool and comfortable. (6)
microprop 3 The sheep like the grass on the high lands. (9)
microprop 4 The children enjoy the fruits and berries that grow on the mountains. (12)

The Durki do not like the valleys in summer. There are many flies and insects. People and sheep get ill in the valleys in summer. The rich summer grass is bad for sheep. It is much too hot.

The Durki like to have their summer camps in the mountains. Hunting is good on the high ground. It is more cool and comfortable. The sheep like the grass on the high lands. The children enjoy the fruits and berries that grow on the mountains.

ELEMENT 4 (inductive paragraph organisation)

- microprop 1 In the winter, there are strong winds in the mountains. (10)
microprop 2 There is a lot of snow. (6)
microprop 3 The grass is not good for the sheep. (8)
microprop 4 The hunting is not good. (5)
macroprop The Durki do not like the mountains in winter. (9)
- microprop 1 The valley forests give shelter from the cold winds. (9)
microprop 2 In winter, the sheep need sheltered valleys. (7)
microprop 3 There is firewood in these forests. (6)
microprop 4 The animals that the Durki hunt come into the valleys in winter. (12)
macroprop The Durki like to have their winter camps in the valleys. (11)

In the winter, there are strong winds in the mountains. There is a lot of snow. The grass is not good for the sheep. The hunting is not good. The Durki do not like the mountains in winter.

The valley forests give shelter from the cold winds. In winter, the sheep need sheltered valleys. There is firewood in these forests. The animals that the Durki hunt come into the valleys in winter. The Durki like to have their winter camps in the valleys.

ELEMENT 5 (causal chain: no dead ends)

- The ways the hunters find animals has not changed.
- prop 1 (on chain) They spread out when they leave their camp. (8)
- prop 2 (on chain) They search among the grass and bushes (7)
- prop 3 (on chain) They look for footprints, or other signs. (7)
- prop 4 (on chain) Broken twigs show where an animal has passed. (8)
- prop 5 (on chain) Sometimes they find scraps of hair. (6)
- prop 1 (on chain) It is easy to follow the tracks. (7)
- prop 2 (on chain) They move very quietly. (4)
- prop 3 (on chain) They do not want the animal to hear them. (9)
- prop 4 (on chain) Soon they catch up with it. (6)
- prop 5 (on chain) Durki hunters move very quickly. (5)

The ways the hunters find animals has not changed. They spread out when they leave their camp. They search among the grass and bushes. They look for footprints, or other signs. Broken twigs show where an animal has passed. Sometimes they find scraps of hair. It is easy to follow the tracks. They move very quietly. They do not want the animal to hear them. Soon they catch up with it. Durki hunters move very quickly.

ELEMENT 6 (causal chain: dead ends)

- The ways the hunters attack animals has not changed.
- prop 1 (on chain) They drive the animal into a small space. (8)
- prop 2 (off chain) Many of the animals are grass eaters. (7)
- prop 3 (on chain) The way out is blocked by sharp sticks. (8)
- prop 4 (off chain) Bamboo sticks are good for this. (7)
- prop 5 (on chain) The hunted animal cannot get away. (6)
- prop 1 (on chain) The hunters move in with their spears. (7)
- prop 2 (off chain) They wear thick jackets. (4)
- prop 3 (on chain) Two men make the attack. (5)
- prop 4 (off chain) The young men have brightly coloured spears. (6)
- prop 5 (on chain) They stab the animal in the neck and heart. (9)

The ways the hunters attack animals has not changed. They drive the animal into a small space. Many of the animals are grass eaters. The way out is blocked by sharp sticks. Bamboo sticks are good for this. The hunted animal cannot get away. The hunters move in with their spears. They wear thick jackets. Two men make the attack. The young men have brightly coloured spears. They stab the animal in the neck and heart.

ELEMENT 7 (initial gist summary)

Because the Durki often move, and they do not have time to waste, their tents are easy to take down.

Macroprop The Durki move camp very often. (6)
microprop Their sheep eat all the grass in one place. (9)
microprop They have to move on to find new grass. (9)
(and)
Macroprop Each time, they are in a hurry to get away. (10)
microprop They have a long way to go. (7)
microprop They cannot go fast. (4)
(so)
microprop It takes a long time to pack everything. (8)
microprop They do not have much time. (6)
Macroprop So their tents must be easy to take down. (9)

Because the Durki often move, and they do not have time to waste, their tents are easy to take down. The Durki move camp very often. Their sheep eat all the grass in one place. They have to move on to find new grass. Each time, they are in a hurry to get away. They have a long way to go. They cannot go fast. It takes a long time to pack everything. They do not have much time. So their tents must be easy to take down.

ELEMENT 8 (no gist summary)

Macroprop The Durki travel a long way. (6)
microprop It can be a very long way between camps. (9)
microprop A good camping place can be difficult to find. (9)
(and)
Macroprop They always have a lot to carry with them. (10)
microprop They carry all their belongings with them. (7)
microprop Nothing is left behind. (4)
(so)
microprop Each pony has to carry a great weight. (8)
microprop The journey is long and hard. (6)
Macroprop So their ponies must be very strong and tough. (9)

The Durki travel a long way. It can be a very long way between camps. A good camping place can be difficult to find. They always have a lot to carry with them. They carry all their belongings with them. Nothing is left behind. Each pony has to carry a great weight. The journey is long and hard. So their ponies must be very strong and tough.

ELEMENT 9 (explicit signal words)

Statement Their tools are always very important to the Durki. (9)
BUT they are difficult to make. (5)
ALSO they are expensive to buy. (5)
THIS IS BECAUSE good tools must be strong. (5)
ALSO they must be long lasting. (5)
SO they must be made of iron or steel. (8)

BUT the Durki cannot easily make things of iron or steel. (10)
 THIS IS BECAUSE they do not stay in one place for long. (9)
 Statement Iron things are made in a forge. (7)
 BUT a forge cannot easily be moved. (6)
 SO the Durki do not have forges. (6)
 BECAUSE OF THIS it is not easy to make tools or mend them. (10)
 SO the Durki take great care of them. (7)

Their tools are always very important to the Durki. But they are difficult to make. Also they are expensive to buy. This is because good tools must be strong. Also they must be long lasting. So they must be made of iron or steel. But the Durki cannot easily make things of iron or steel. This is because they do not stay in one place for long. Iron things are made in a forge. But a forge cannot easily be moved. So the Durki do not have forges. Because of this, it is not easy to make tools or mend them. So the Durki take great care of them.

ELEMENT 10 (implicit signal words)

Statement The Durki take great care of their hunting weapons. (9)
 BUT Often they can be broken. (5)
 ALSO Often they can be lost. (5)
 THIS IS BECAUSE Hunting is dangerous and difficult. (5)
 ALSO Sometimes the speared animal escapes. (5)
 SO The valuable spear is broken or carried off. (8)
 BUT It can be very difficult to get new hunting spears. (10)
 THIS IS BECAUSE The wood that they need is hard to get. (9)
 Statement They need light, strong and straight wood. (7)
 BUT It is very difficult to find. (6)
 SO They have to travel far for it. (7)
 BECAUSE OF THIS Finding wood to make new spears takes a long time. (10)
 SO Spears are very important to the Durki. (7)

The Durki take great care of their hunting weapons. Often they can be broken. Often they can be lost. Hunting is dangerous and difficult. Sometimes the speared animal escapes. The valuable spear is broken or carried off. It can be very difficult to get new hunting spears. The wood that they need is hard to get. They need light, strong and straight wood. It is very difficult to find. They have to travel far for it. Finding wood to make new spears takes a long time. Spears are very important to the Durki.

NORMAL DIFFICULTY ELEMENTS

ELEMENT 11 (text density: high level of supporting detail)

macroprop When the Durki are in a settled camp, there is plenty of time for preparing food. (16)
 microprop 1 There is time to gather delicious fruits and berries. (9)

- microprop 2 Huntsmen can take the time to find the best game. (10)
- microprop 3 Meats and sauces can be cooked gently over a low fire. (11)
- microprop 4 Herbs and spices can be gathered, and added carefully to the cookpot. (12)
- macroprop When they are not moving on, food is something special, to be lingered over. (14)
- microprop 1 The evening meal starts quite early. (6)
- microprop 2 There are several courses. (4)
- microprop 3 The men drink wine with their food. (7)
- microprop 4 After the meal, they sit around the fire with bitter coffee. (11)

When the Durki are in a settled camp, there is plenty of time for preparing food. There is time to gather delicious fruits and berries. Huntsmen can take the time to find the best game. Meats and sauces can be cooked gently over a low fire. Herbs and spices can be gathered, and added carefully to the cookpot. When they are not moving on, food is something special, to be lingered over. The evening meal starts quite early. There are several courses. The men drink wine with their food. After the meal, they sit around the fire with bitter coffee.

ELEMENT 12 (text density: low level of supporting detail)

- macroprop When the Durki are not in a settled camp, there is little time for preparing food. (16)
- microprop 1 The travelling on from place to place takes too much time. (11)
- microprop 2 Preparing meals takes time, and there is little time. (9)
- microprop 3 All the time is taken up in moving slowly onwards. (10)
- microprop 4 There is little spare time when the tribe is always moving on. (12)
- macroprop When they are moving on, food is plain and simple, to be eaten quickly. (14)
- microprop 1 It is eaten in a hurry. (6)
- microprop 2 Meals are very rushed. (4)
- microprop 3 There is time only for simple food. (7)
- microprop 4 Time being so short, there is no time for anything fancy. (11)

When the Durki are not in a settled camp, there is little time for preparing food. The travelling on from place to place takes too much time. Preparing meals takes time, and there is little time. All the time is taken up in moving slowly onwards. There is little spare time when the tribe is always moving on. When they are moving on, food is plain and simple, to be eaten quickly. It is eaten in a hurry. Meals are very rushed. There is time only for simple food. Time being so short, there is no time for anything fancy.

ELEMENT 13 (deductive paragraph organisation)

- macroprop The old men of the tribe have great knowledge and long experience. (11)
- microprop 1 When there is illness among the sheep, they have learned what to do. (13)
- microprop 2 When water is short during the long summers, they know what to do. (13)
- microprop 3 When the normal pastures are overgrazed, they know where to find good grass. (13)
- microprop 4 They have learned exactly the ways of all the animals that the tribe hunt. (14)

- macroprop These old men are cared for and looked up to by the younger people of the tribe. (17)
- microprop 1 They are given the best places around the fire during the long winter evenings. (14)
- microprop 2 At meals, they are given the best meat, the most tender vegetables, the finest fruits and choicest drinks. (18)
- microprop 3 The younger folk do not interrupt when an old man is speaking. (12)
- microprop 4 When an old man gives an order, the young men obey it quickly. (13)

The old men of the tribe have great knowledge and long experience. When there is illness among the sheep, they have learned what to do. When water is short during the long summers, they know what to do. When the normal pastures are overgrazed, they know where to find good grass. They have learned exactly the ways of all the animals that the tribe hunt.

These old men are cared for and looked up to by the younger people of the tribe. They are given the best places around the fire during the long winter evenings. At meals, they are given the best meat, the most tender vegetables, the finest fruits and choicest drinks. The younger folk do not interrupt when an old man is speaking. When an old man gives an order, the young men obey it quickly.

ELEMENT 14 (inductive paragraph organisation)

- microprop 1 The young men of the tribe love to train themselves and take exercise. (13)
- microprop 3 When they are walking, they take pride in covering great distances very quickly. (13)
- microprop 3 When they have any spare time, they train themselves for the tribe's traditional games. (14)
- microprop 4 When they eat, they choose food that is good for them, and nourishing. (13)
- macroprop The young men of the tribe are unusually healthy and strong. (11)

- microprop 1 Every day, they have to round up the scattered sheep and move them on to find new grass. (18)
- microprop 2 They have to hunt far and wide for animals for the cooking pots. (13)
- microprop 3 They spend hours working with and training their wild and hardy ponies. (12)
- microprop 4 They work about the camp, making and mending tents, tools, weapons, equipment, and harnesses. (14)

macroprop

Each day of their lives, these young men have to get through a great amount of work. (17)

The young men of the tribe love to train themselves and take exercise. When they are walking, they take pride in covering great distances very quickly. When they have any spare time, they train themselves for the tribe's traditional games. When they eat, they choose food that is good for them, and nourishing. The young men of the tribe are unusually healthy and strong.

Every day, they have to round up the scattered sheep and move them on to find new grass. They have to hunt far and wide for animals for the cooking pots. They spend hours working with and training their wild and hardy ponies. They work about the camp, making and mending tents, tools, weapons, equipment, and harnesses. Each day of their lives, these young men have to get through a great amount of work.

ELEMENT 15 (causal chain - no dead ends)

- | | |
|-------------------|---|
| prop 1 (on chain) | These days, the Durki use shearing machines to shear their sheep, instead of the old, hand-held shearing scissors. (19) |
| prop 2 (on chain) | They much prefer to use these new machines. (8) |
| prop 3 (on chain) | They cut a lot closer and give much more wool. (10) |
| prop 4 (on chain) | The sharp and fast moving sets of blades always give a much cleaner cut. (14) |
| prop 5 (on chain) | Modern machine shearing does less damage to the wool than shearing by hand. (13) |
| prop 1 (on chain) | Another advantage is that the machines do the job much more quickly. (12) |
| prop 2 (on chain) | Hundreds of sheep are sheared in one day. (8) |
| prop 3 (on chain) | The shearing machines need fewer men than the old hand shearing. (11) |
| prop 4 (on chain) | The machines are quite easy to use. (7) |
| prop 5 (on chain) | They are also easy to keep in good working order. (10) |

These days, the Durki use shearing machines to shear their sheep, instead of the old, hand-held shearing scissors. They much prefer to use these new machines. They cut a lot closer and give much more wool. The sharp and fast moving sets of blades always give a much cleaner cut. Modern machine shearing does less damage to the wool than shearing by hand. Another advantage is that the machines do the job much more quickly. Hundreds of sheep are sheared in one day. The shearing machines need fewer men than the old hand shearing. The machines are quite easy to use. They are also easy to keep in good working order.

ELEMENT 16 (causal chain: dead ends)

- | | |
|--------------------|---|
| prop 1 (on chain) | Nowadays, the Durki use small power-driven spinning jennies to spin their wool, instead of the old spinning wheel. (19) |
| prop 2 (off chain) | Most of the jennies are made in America. (8) |
| prop 3 (on chain) | Wool spun in this way is more smooth and even. (10) |

- prop 4 (off chain) Much of the wool is sold to the Arab tribes further to the south. (14)
- prop 5 (on chain) Wool spun on a jenny is a little stronger than hand spun wool. (13)
- prop 1 (on chain) The power-driven jennies give a wool that is thinner and finer. (12)
- prop 2 (off chain) The spinning is done mostly by older women. (8)
- prop 3 (on chain) The jennies give a longer thread than the old spinning wheels. (11)
- prop 4 (off chain) The old spinning wheels were brightly painted. (7)
- prop 5 (on chain) The power-driven jenny is much less tiring to use. (10)

Nowadays, the Durki use small power-driven spinning jennies to spin their wool, instead of the old spinning wheel. Most of the jennies are made in America. Wool spun in this way is more smooth and even. Much of the wool is sold to the Arab tribes further to the south. Wool spun on a jenny is a little stronger than hand spun wool. The power-driven jennies give a wool that is thinner and finer. The spinning is done mostly by older women. The jennies give a longer thread than the old spinning wheels. The old spinning wheels were brightly painted. The power-driven jenny is much less tiring to use.

ELEMENT 17 (initial gist summary)

Because clear leadership is needed, to decide where the tribe goes, and to enforce its laws, the Durki have a strong chief.

macroprop In a wandering group such as this, constant decisions have to be made about where the tribe should go next. (20)

microprop The right decision has to be made. (7)

microprop The survival of the whole group depends upon it. (9)

(and)

macroprop In a busy and bustling community there is a need for someone to act as judge and lawmaker. (18)

microprop As everywhere else, there are thieves, swindlers and violent men among the Durki. (13)

microprop For the sake of the whole tribe, justice has to be swift and fair. (14)

(so)

microprop So the Durki look among themselves for someone suitable. (9)

microprop It must be someone who they will all trust and follow. (11)

macroprop The tribe then elect him chief, and obey him in every way. (12)

Because clear leadership is needed, to decide where the tribe goes, and to enforce its laws, the Durki have a strong chief. In a wandering group such as this, constant decisions have to be made about where the tribe should go next. The right decision has to be made. The survival of the whole group depends upon it. In a busy and bustling community there is a need for someone to act as judge and lawmaker. As everywhere else, there are thieves,

swindlers and violent men among the Durki. For the sake of the whole tribe, justice has to be swift and fair. So the Durki look among themselves for someone suitable. It must be someone who they will all trust and follow. The tribe then elect him chief, and obey him in every way.

ELEMENT 18 (no gist summary)

macroprop Like so many people who live simple and hard lives, the Durki tribesmen are a deeply godfearing and religious folk. (20)
microprop They have always been the same way. (7)
microprop Their gods play a large part in their lives. (9)
(and)
macroprop Naturally, the people of the tribe want to do all they can to please and satisfy their gods. (18)
microprop Gods who are not treated well might not look after their people properly. (13)
microprop They might even become angry, and send all kinds of hardships as a punishment. (14)
(so)
microprop Not everyone can be expected to understand the gods. (9)
microprop It is a special job, and needs special kinds of people. (11)
macroprop The tribe has very many priests, and they keep the gods happy. (12)

Like so many people who live simple and hard lives, the Durki tribesmen are a deeply godfearing and religious folk. They have always been the same way. Their gods play a large part in their lives. Naturally, the people of the tribe want to do all they can to please and satisfy their gods. Gods who are not treated well might not look after their people properly. They might even become angry, and send all kinds of hardships as a punishment. Not everyone can be expected to understand the gods. It is a special job, and needs special kinds of people. The tribe has very many priests, and they keep the gods happy.

ELEMENT 19 (explicit signal words)

statement Ponies are expensive to buy and to look after. (9)
BUT The Durki need them as pack animals. (7)
ALSO They need them when they go hunting in the forests and on the mountain slopes. (15)
THIS IS BECAUSE Without ponies, they would not be able to carry the tribe's possessions from camp to camp. (16)
ALSO They would not be able to hunt far from their camp. (11)
SO Each family has at least one pony, despite the costs. (10)
BUT Sometimes a pony has to be sold or destroyed. (9)
THIS IS BECAUSE The expense of keeping it becomes too much. (8)
statement Winters in the Elburz mountains are short. (7)

BUT	They can be very cold, with snow lying on the ground throughout. (12)
SO	Winter feed for the ponies can be very difficult to find. (11)
BECAUSE OF THIS	The family would have to buy in feed, and they cannot afford to do that. (15)
SO	Sometimes, a family just cannot keep their pony. (8)

Ponies are expensive to buy and to look after. But the Durki need them as pack animals. Also they need them when they go hunting in the forests and on the mountain slopes. This is because without ponies, they would not be able to carry the tribe's possessions from camp to camp. Also they would not be able to hunt far from their camp. So each family has at least one pony, despite the costs. But sometimes a pony has to be sold or destroyed. This is because the expense of keeping it becomes too much. Winters in the Elburz mountains are short. But they can be very cold, with snow lying on the ground throughout. So winter feed for the ponies can be very difficult to find. Because of this the family would have to buy in feed, and they cannot afford to do that. So sometimes a family just cannot keep their pony.

ELEMENT 20 (implicit signal words)

statement	Sheep are the most treasured possession of the Durki. (9)
BUT	They can be difficult to keep healthy. (7)
ALSO	They sometimes lose large numbers when they are out grazing on the hills at night. (15)
THIS IS BECAUSE	The Durki do not have modern medicines to deal with the many diseases sheep can get. (16)
ALSO	They cannot always save them from hungry wolves and wild cats. (11)
SO	However hard they try, the Durki lose quite a number. (10)
BUT	Sometimes the Durki themselves destroy large numbers of sheep. (9)
THIS IS BECAUSE	In the dry season water can be scarce. (8)
statement	There is not a shortage every year. (7)
BUT	When there is a shortage, it can be a very serious one. (12)
SO	Sheep, ponies, men, women and children all need water to live. (11)
BECAUSE OF THIS	There is not enough to go round, and sometimes desperate action needs to be taken. (15)
SO	The Durki have to destroy their treasured sheep. (8)

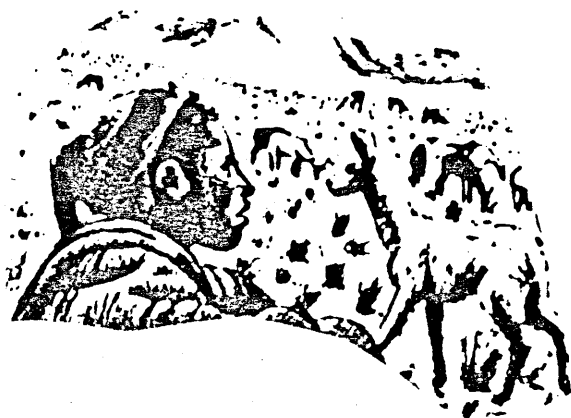
Sheep are the most treasured possession of the Durki. They can be difficult to keep healthy. They sometimes lose large numbers when they are out grazing on the hills at night. The Durki do not have modern medicines to deal with the many diseases sheep can get. They cannot always save them from hungry wolves and wild cats. However hard they try, the Durki lose quite a

number. Sometimes the Durki themselves destroy large numbers of sheep. In the dry season water can be scarce. There is not a shortage every year. When there is a shortage, it can be a very serious one. Sheep, ponies, men, women and children all need water to live. There is not enough to go round, and sometimes desperate action needs to be taken. The Durki have to destroy their treasured sheep.

THE HERDSMEN OF THE MOUNTAINS

PART 1

The Durki live in the Elburz mountains. They are sheep herders and hunters. They move on from place to place. In many ways, they live as they did hundreds of years ago.



The Durki do not like the valleys in summer. There are many flies and insects. People and sheep get ill in the valleys in summer. The rich summer grass is bad for sheep. It is much too hot.

The Durki like to have their summer camps in the mountains. Hunting is good on the high ground. It is more cool and comfortable. The sheep like the grass on the high lands. The children enjoy the fruits and berries that grow on the mountains.

In the winter, there are strong winds in the mountains. There is a lot of snow. The grass is not good for the sheep. The hunting is not good. The Durki do not like the mountains in winter.

The valley forests give shelter from the cold winds. In winter, the sheep need sheltered valleys. There is firewood in these forests. The animals that the Durki hunt come into the valleys in winter. The Durki like to have their winter camps in the valleys.

Because the Durki often move, and they do not have time to waste, their tents are easy to take down. The Durki move camp very often. Their sheep eat all the grass in one place. They have to move on to find new grass. Each time, they are in a hurry to get away. They have a long way to go. They cannot go fast. It takes a long time to pack everything. They do not have much time. So their tents must be easy to take down.

The Durki travel a long way. It can be a very long way between camps. A good camping place can be difficult to find. They always have a lot to carry with them. They carry all their belongings with them. Nothing is left behind. Each pony has to carry a great weight. The journey is long and hard. So their ponies must be very strong and tough.

Their tools are always very important to the Durki. But they are difficult to make. Also they are expensive to buy. This is because good tools must be strong. Also they must be long lasting. So they must be made of iron or steel. But the Durki cannot easily make things of iron or steel. This is because they do not stay in one place for long. Iron things are made in a forge. But a forge cannot easily be moved. So the Durki do not have forges. Because of this, it is not easy to make tools or mend them. So the Durki take great care of them.

The Durki take great care of their hunting weapons. Often they can be broken. Often they can be lost. Hunting is dangerous and difficult. Sometimes the speared animal escapes. The valuable spear is broken or carried off. It can be very difficult to get new hunting spears. The wood that they need is hard to get. They need light, strong and straight wood. It is very difficult to find. They have to travel far for it. Finding wood to make new spears takes a long time. Spears are very important to the Durki.

The ways the hunters find animals has not changed. They spread out when they leave their camp. They search among the grass and bushes. They look for footprints, or other signs. Broken twigs show where an animal has passed. Sometimes they find scraps of hair. It is easy to follow the tracks. They move very quietly. They do not want the animal to hear them. Soon they catch up with it. Durki hunters move very quickly.

The ways the hunters attack animals has not changed. They drive the animal into a small space. Many of the animals are grass eaters. The way out is blocked by sharp sticks. Bamboo sticks are good for this. The hunted animal cannot get away. The hunters move in with their spears. They wear thick jackets. Two men make the attack. The young men have brightly coloured spears. They stab the animal in the neck and heart.

In summer, it is good to be outside in the fine evenings. The evenings are long and light. There is a soft wind and warm sunshine. There is a smell of flowers. The grass is dry to sit on. Families stay outside their tents until dark. The women cook the evening meal outside, on open fires. People eat and children play in front of their tents. They go from tent to tent, visiting their friends. Evening meetings are held outside.

In winter, no-one wants to be outside in the cold, dark evenings. The evenings are cold and dark. There is no light outside to see by. Darkness comes early in the evening. It gets cold as it gets dark. Families spend the evenings in their tents. Most people want to be inside, out of the cold. People need warmth and they need light in the evenings. There is light to see by in the tents. Also, it is warm inside.

THE HERDSMEN OF THE MOUNTAINS

PART 2

Ponies are expensive to buy and to look after. But the Durki need them as pack animals. Also they need them when they go hunting in the forests and on the mountain slopes. This is because without ponies, they would not be able to carry the tribe's possessions from camp to camp. Also they would not be able to hunt far from their camp. So each family has at least one pony, despite the costs. But sometimes a pony has to be sold or destroyed. This is because the expense of keeping it becomes too much. Winters in the Elburz mountains are short. But they can be very cold, with snow lying on the ground throughout. So winter feed for the ponies can be very difficult to find. Because of this the family would have to buy in feed, and they cannot afford to do that. So sometimes a family just cannot keep their pony.

Sheep are the most treasured possession of the Durki. They can be difficult to keep healthy. They sometimes lose large numbers when they are out grazing on the hills at night. The Durki do not have modern medicines to deal with the many diseases sheep can get. They cannot always save them from hungry wolves and wild cats. However hard they try, the Durki lose quite a number. Sometimes the Durki themselves destroy large numbers of sheep. In the dry season water can be scarce. There is not a shortage every year. When there is a shortage, it can be a very serious one. Sheep, ponies, men, women and children all need water to live. There is not enough to go round, and sometimes desperate action needs to be taken. The Durki have to destroy their treasured sheep.

These days, the Durki use shearing machines to shear their sheep, instead of the old, hand-held shearing scissors. They much prefer to use these new machines. They cut a lot closer and give much more wool. The sharp and fast moving sets of blades always give a much cleaner cut. Modern machine shearing does less damage to the wool than shearing by hand. Another advantage is that the machines do the job much more quickly. Hundreds of sheep are sheared in one day. The shearing machines need fewer men than the old hand shearing. The machines are quite easy to use. They are also easy to keep in good working order.

Nowadays, the Durki use small power-driven spinning jennies to spin their wool, instead of the old spinning wheel. Most of the jennies are made in America. Wool spun in this way is more smooth and even. Much of the wool is sold to the Arab tribes further to the south. Wool spun on a jenny is a little stronger than hand spun wool. The power-driven jennies give a wool that is thinner and finer. The spinning is done mostly by older women. The jennies give a longer thread than the old spinning wheels. The old spinning wheels were brightly painted. The power-driven jenny is much less tiring to use.

When the Durki are in a settled camp, there is plenty of time for preparing food. There is time to gather delicious fruits and berries. Huntsmen can take the time to find the best game. Meats and sauces can be cooked gently over a low fire. Herbs and spices can be gathered, and added carefully to the cookpot. When they are not moving on, food is something special, to be lingered over. The evening meal starts quite early. There are several courses. The men drink wine with their food. After the meal, they sit around the fire with bitter coffee.

When the Durki are not in a settled camp, there is little time for preparing food. The travelling on from place to place takes too much time. Preparing meals takes time, and there is little time. All the time is taken up in moving slowly onwards. There is little spare time when the tribe is always moving on. When they are moving on, food is plain and simple, to be eaten quickly. It is eaten in a hurry. Meals are very rushed. There is time only for simple food. Time being so short, there is no time for anything fancy.

The old men of the tribe have great knowledge and long experience. When there is illness among the sheep, they have learned what to do. When water is short during the long summers, they know what to do. When the normal pastures are overgrazed, they know where to find good grass. They have learned exactly the ways of all the animals that the tribe hunt.

These old men are cared for and looked up to by the younger people of the tribe. They are given the best places around the fire during the long winter evenings. At meals, they are given the best meat, the most tender vegetables, the finest fruits and choicest drinks. The younger folk do not interrupt when an old man is speaking. When an old man gives an order, the young men obey it quickly.

The young men of the tribe love to train themselves and take exercise. When they are walking, they take pride in covering great distances very quickly. When they have any spare time, they train themselves for the tribe's traditional games. When they eat, they choose food that is good for them, and nourishing. The young men of the tribe are unusually healthy and strong.

Every day, they have to round up the scattered sheep and move them on to find new grass. They have to hunt far and wide for animals for the cooking pots. They spend hours working with and training their wild and hardy ponies. They work about the camp, making and mending tents, tools, weapons, equipment, and harnesses. Each day of their lives, these young men have to get through a great amount of work.

Because clear leadership is needed, to decide where the tribe goes, and to enforce its laws, the Durki have a strong chief. In a wandering group such as this, constant decisions have to be made about where the tribe should go next. The right decision has to be made. The survival of the whole group depends upon it. In a busy and bustling community there is a need for someone to act as judge and lawmaker. As everywhere else, there are thieves, swindlers and violent men among the Durki. For the sake of the whole tribe, justice has to be swift and fair. So the Durki look among themselves for someone suitable. It must be someone who they will all trust and follow. The tribe then elect him chief, and obey him in every way.

Like so many people who live simple and hard lives, the Durki tribesmen are a deeply godfearing and religious folk. They have always been the same way. Their gods play a large part in their lives. Naturally, the people of the tribe want to do all they can to please and satisfy their gods. Gods who are not treated well might not look after their people properly. They might even become angry, and send all kinds of hardships as a punishment. Not everyone can be expected to understand the gods. It is a special job, and needs special kinds of people. The tribe has very many priests, and they keep the gods happy.

Test for The Herdsmen of the Mountains

PART 1:

Answer these questions. Write the answers on the answer sheet.

YOU NEED NOT WRITE IN SENTENCES - A FEW WORDS IS ENOUGH

1. Where do the Durki spend the evenings in the summer months ?
2. Give one reason for this.
3. Where do the Durki spend the evenings in the winter months ?
4. Give one reason for this.
5. Where do the Durki like to have their camps in summer ?
6. Give one reason for this.
7. Where do the Durki like to have their camps in winter ?
8. Give one reason for this.
9. What is special about the Durki tents ?
10. Give one reason for this.
11. What is special about the Durki ponies ?
12. Give one reason for this.
13. Why must their tools be made of iron or steel ?
14. Why is it not easy for them to make tools or mend them ?
15. Why do hunters' spears get broken or carried off ?
16. Why does it take a long time to make new spears ?

17. *Some of these sentences were in the passage, and some were not.*

*On the answer sheet, TICK the ones that you can remember.
Put a CROSS by the ones by the ones you cannot remember.*

- (a) The Durki like hunting at night.
- (b) They search among the grass and bushes.
- (c) Broken twigs show where an animal has passed.
- (d) They move very quietly.
- (e) Soon they catch up with it.
- (f) Many of the animals are grass eaters.
- (g) They dig deep pits to trap the animals.
- (h) Bamboo sticks are good for this.
- (i) The young men have brightly coloured spears.
- (j) They wear thick jackets.

Test for The Herdsmen of the Mountains

PART 2:

Answer these questions. Write the answers on the answer sheet.

YOU NEED NOT WRITE IN SENTENCES - A FEW WORDS IS ENOUGH

1. How do the Durki eat when they are in a settled camp ?
2. Give one reason for this.
3. How do the Durki eat when they are not in a settled camp ?
4. Give one reason for this.
5. How do the Durki treat the old men of the tribe ?
6. Give one reason for this.
7. What is special about the young men of the tribe ?
8. Give one reason for this.
9. What kind of people must the Durki chiefs be ?
10. Give one reason why they have to be like this ?
11. The tribe has a lot of people to do one special job. What is that job ?
12. Give one reason why they have these people.
13. Why does each family keep a pony, despite the costs ?
14. Why do they sometimes have to buy feed for the ponies ?
15. How do the Durki lose quite a lot of their sheep ?
16. Why do they sometimes have to take desperate action and destroy their sheep ?
17. *Some of these sentences were in the passage, and some were not.*
On the answer sheet, TICK the ones that you can remember.
Put a CROSS by the ones by the ones you cannot remember.
 - (a) Hundreds of sheep are sheared in one day.
 - (b) The machines are quite easy to use.
 - (c) They much prefer to use these new machines.
 - (d) It is the job of the old men to clean and oil them.
 - (e) The sharp and fast moving sets of blades always give a much cleaner cut.
 - (f) Most of the jennies are made in America.
 - (g) The Durki buy them when they visit the bigger towns.
 - (h) Much of the wool is sold to the Arab tribes further to the south.
 - (i) The spinning is done mostly by older women.
 - (j) The old spinning wheels were brightly painted.

Answer sheet for PART 1

NAME: _____ BOY/GIRL: _____

(REMEMBER: just a few words is enough for each answer)

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____
- 7. _____
- 8. _____
- 9. _____
- 10. _____
- 11. _____
- 12. _____
- 13. _____
- 14. _____
- 15. _____
- 16. _____

17. *TICK the ones you remember. Put a CROSS by the ones you do not remember.*

<i>a</i>	
<i>b</i>	
<i>c</i>	
<i>d</i>	
<i>e</i>	

<i>f</i>	
<i>g</i>	
<i>h</i>	
<i>i</i>	
<i>j</i>	

Answer sheet for PART 2

NAME: _____ BOY/GIRL: _____

(REMEMBER: just a few words is enough for each answer)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____

17. TICK the ones you remember. Put a CROSS by the ones you do not remember.

a	
b	
c	
d	
e	

f	
g	
h	
i	
j	

APPENDIX FOURTEEN.

Stage Two Results.

Stage 2 results.

In the 3 x 2 contingency tables for the Chi Squared analyses, presented below, the main entries show the Observed Frequencies. The relevant Expected Frequencies are shown below in brackets. Where the expected frequencies were low (less than ten), contingency tables were conflated from six to four cells, and Chi Squared calculated from the resulting 2 x 2 tables. Where the expected frequencies remained less than ten, Yates's Correction was applied.

(i) Overall Scores

Table 1. Density of supporting information

Simple level text: High density mean score 1.34
 Low density mean score 1.58
 Chi Squared = 8.014, $p < 0.01$

	0/1	2	total
high	58 (46.5)	102 (113.5)	160
low	35 (46.5)	125 (113.5)	160
total	93	227	320

Normal level text: High density mean score 0.875
 Low density mean score 1.18
 Chi Squared = 9.369, $p < 0.01$

	0	1	2	total
high	77 (66)	26 (23.5)	57 (70.5)	160
low	55 (66)	21 (23.5)	84 (70.5)	160
total	132	47	141	320

Table 2. Deductive/Inductive paragraph organisation

Simple level text: Deductive mean score 1.07
 Inductive mean score 0.97
 Chi Squared = 2.853, $p > 0.05$

	0	1	2	total
deductive	60 (61.5)	29 (34)	71 (64.5)	160
inductive	63 (61.5)	39 (34)	58 (64.5)	160
total	123	68	129	320

Normal level text: Deductive mean score 1.39
 Inductive mean score 0.77
 Chi Squared = 64.3, $p < 0.01$

	0	1	2	total
deductive	16 (49)	66 (49.5)	78 (61.5)	160
inductive	82 (49)	33 (49.5)	45 (61.5)	160
total	98	99	123	320

Table 3. Causal chain characteristics
(N=160)

		Simple text (/5)	Normal text (/5)
On chain	Mean	3.66	3.96
	SD	1.38	1.31
Off chain	Mean	3.76	3.59
	SD	1.43	1.34
Statistical sig.		p=0.3143	p=0.0007

Analysis of variance: Normal text, causal chain characteristics

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratio	Probability
On/off chain	10.878	1	10.878	12.477	0.0007
Subjects	419.747	159	2.6399	3.0280	0.0000
Error	138.622	159	0.8718		
Total	569.247	319			

Table 4. Explicit/implicit use of signal words

Simple level text: Explicit mean score 1.26
Implicit mean score 0.95
Chi Squared = 13.414, $p < 0.01$

	0	1	2	total
Explicit	25 (38)	69 (67)	66 (55)	160
Implicit	51 (38)	65 (67)	44 (55)	160
total	76	134	110	320

Normal level text: Explicit mean score 0.99
Implicit mean score 0.88
Chi Squared = 8.982, $p < 0.02$

	0	1	2	total
Explicit	28 (38.5)	105 (93)	27 (28.5)	160
Implicit	49 (38.5)	81 (93)	30 (28.5)	160
total	77	186	57	320

Table 5. Effect of initial gist summary

Simple level text: Gist mean score 1.36
No gist mean score 1.3
Chi Squared = 0.250, $p > 0.05$

	0	1	2	total
gist	40 (41.5)	24 (25)	96 (93.5)	160
no gist	43 (41.5)	26 (25)	91 (93.5)	160
total	83	50	187	320

Normal level text: Gist mean score 0.7
 No gist mean score 0.11
 Chi Squared = 107.629, $p < 0.01$

	0	1	2	total
gist	68 (109.5)	72 (36)	20 (14.5)	160
no gist	151 (109.5)	0 (36)	9 (14.5)	160
total	219	72	29	320

(ii) Scores by sex

Table 6. Total scores, by sex

N(girls)=82 N(boys)=78 (Max. score 52)

Girls	Mean	30.80
	SD	9.22
Boys	Mean	32.53
	SD	8.51
Statistical sig. $p=0.22$		

Table 7. Density of supporting information

Boys, simple level text: High density mean score 1.38
 Low density mean score 1.60
 Chi Squared = 3.258, $p > 0.05$

	0/1	2	total
High	26 (21)	52 (57)	78
Low	16 (21)	62 (57)	78
total	42	114	156

Girls, simple level text: High density mean score 1.29
 Low density mean score 1.55
 Chi Squared = 4.81, $p < 0.05$

	0/1	2	total
High	32 (25.5)	50 (56.5)	82
Low	19 (25.5)	63 (56.5)	82
total	51	113	164

Boys, normal level text: High density mean score 0.78
 Low density mean score 1.03
 Chi Squared = 2.767, $p > 0.05$

	0	1	2	total
High	42 (37)	11 (11.5)	25 (29.5)	78
Low	32 (37)	12 (11.5)	34 (29.5)	78
total	74	23	59	156

Girls, normal level text: High density mean score 0.96
 Low density mean score 1.33
 Chi Squared = 7.934, $p < 0.02$

	0	1	2	total
High	35 (29)	15 (12)	32 (41)	82
Low	23 (29)	9 (12)	50 (41)	82
total	58	24	82	164

Table 8. Deductive/inductive paragraph organisation

Boys, simple level text: Deductive mean score 1.09
 Inductive mean score 1.12
 Chi Squared = 1.367, $p > 0.05$

	0	1	2	total
Deductive	28 (26)	15 (18)	35 (34)	78
Inductive	24 (26)	21 (18)	33 (34)	78
total	52	36	68	156

Girls, simple level text: Deductive mean score 1.05
 Inductive mean score 0.83
 Chi Squared = 3.172, $p > 0.05$

	0	1	2	total
Deductive	32 (35.5)	14 (16)	36 (30.5)	82
Inductive	39 (35.5)	18 (16)	25 (30.5)	82
total	71	32	61	164

Boys, normal level text: Deductive mean score 1.37
 Inductive mean score 0.79
 Chi Squared = 34.343, $p < 0.01$

	0	1	2	total
Deductive	8 (24.5)	33 (22.5)	37 (31)	78
Inductive	41 (24.5)	12 (22.5)	25 (31)	78
total	49	45	62	156

Girls, normal level text: Deductive mean score 1.40
 Inductive mean score 0.74
 Chi Squared = 32.117, $p < 0.01$

	0	1	2	total
Deductive	8 (24.5)	33 (27)	41 (30.5)	82
Inductive	41 (24.5)	21 (27)	20 (30.5)	82
total	49	54	61	164

Table 9. Causal chain characteristics
N(girls)=82 N(boys)=78

		Simple text (/5)		Normal text (/5)	
		Boys	Girls	Boys	Girls
On chain	Mean	3.96	3.37	3.97	3.95
	SD	1.20	1.48	1.31	1.32
Off Chain	Mean	4.00	3.52	3.51	3.67
	SD	1.25	1.55	1.32	1.36
Statistical sig.		0.7431	0.3188	0.0070	0.0294

Analysis of variance: Normal text, boys, causal chain characteristics

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratio	Probability
On/off chain	8.3077	1	8.3077	7.6434	0.0070
Subjects	181.74	77	2.3603	2.1716	0.0004
Error	83.692	77	1.0869		
Total	273.74	155			

Analysis of variance: Normal text, girls, causal chain characteristics

Sources of Variance	Sums of Squares	Degrees of Freedom	Mean Squares	F Ratio	Probability
On/off chain	3.2256	1	3.2256	4.8140	0.0294
Subjects	237.64	81	2.9338	4.3785	0.0000
Error	54.274	81	0.6701		
Total	295.14	163			

(A more extended, 2x2 analysis, to probe any interaction between sex and causal chain characteristics, was not carried out. With the statistical package being used, this would have involved a fresh file and re-entering the data; inspection of the mean scores indicated that nothing would be gained from this.)

Table 10. Explicit/implicit use of signal words

Boys, simple level text: Explicit mean score 1.32
Implicit mean score 1.08
Chi Squared = 4.676, $p > 0.05$

	0	1	2	total
Explicit	10 (15)	33 (32.5)	35 (30.5)	78
Implicit	20 (15)	32 (32.5)	26 (30.5)	78
total	30	65	61	156

Girls, simple level text: Explicit mean score 1.20
 Implicit mean score 0.84
 Chi Squared = 9.144, $p < 0.02$

	0	1	2	total
Explicit	15 (23)	36 (34.5)	31 (24.5)	82
Implicit	31 (23)	33 (34.5)	18 (24.5)	82
total	46	69	49	164

Boys, normal level text: Explicit mean score 1.01
 Implicit mean score 0.97
 Chi Squared = 2.286, $p > 0.05$

	0	1	2	total
Explicit	13 (16)	51 (46.5)	14 (15.5)	78
Implicit	19 (16)	42 (46.5)	17 (15.5)	78
total	32	93	31	156

Girls, normal level text: Explicit mean score 0.98
 Implicit mean score 0.79
 Chi Squared = 7.419, $p < 0.05$

	0	1	2	total
Explicit	15 (22.5)	54 (46.5)	13 (13)	82
Implicit	30 (22.5)	39 (46.5)	13 (13)	82
total	45	93	26	164

Table 11. Effect of initial gist summary

Boys, simple level text: Gist mean score 1.42
 no gist mean score 1.28
 Chi Squared = 1.409, $p > 0.05$

	0	1	2	total
Gist	17 (19)	11 (12.5)	50 (46.5)	78
No gist	21 (19)	14 (12.5)	43 (46.5)	78
total	38	25	93	156

Girls, simple level text: Gist mean score 1.28
 no gist mean score 1.32
 Chi Squared = 0.105, $p > 0.05$

	0	1	2	total
Gist	23 (22.5)	13 (12.5)	46 (47)	82
No gist	22 (22.5)	12 (12.5)	48 (47)	82
total	45	25	94	164

Boys, normal level text: Gist mean score 0.64
no gist mean score 0.13
Chi Squared = 41.688, $p < 0.01$

	0	1/2	total
Gist	36 (54.5)	42 (23.5)	78
No gist	73 (54.5)	5 (23.5)	78
total	109	47	156

Girls, normal level text: Gist mean score 0.76
no gist mean score 0.10
Chi Squared = 58.421, $p < 0.01$

	0	1/2	total
Gist	32 (55)	50 (27)	82
No gist	78 (55)	4 (27)	82
total	110	54	164

(iii) Scores by ability

Readers' total scores were ranked, and analyses were carried out for each text feature, for the forty most successful readers and the forty least successful.

Table 12. Density of supporting information

High ability readers, simple level text:

High density mean score 1.825
Low density mean score 1.9
Chi Squared = 0.181, $p > 0.05$

	0/1	2	total
High den.	4 (3)	36 (37)	40
Low den.	2 (3)	38 (37)	40
total	6	74	80

Low ability readers, simple level text:

High density mean score 0.65
Low density mean score 1.125
Chi Squared = 6.241, $p < 0.02$

	0/1	2	total
High den.	29 (23.5)	11 (16.5)	40
Low den.	18 (23.5)	22 (16.5)	40
total	47	33	80

High ability readers, normal level text:

High density mean score 1.7
 Low density mean score 1.925
 Chi Squared = 4.804, $p < 0.05$

	0/1	2	total
High den.	10 (6)	30 (34)	40
Low den.	2 (6)	38 (34)	40
total	12	68	80

Low ability readers, normal level text:

High density mean score 0.25
 Low density mean score 0.5
 Chi Squared = 1.726, $p > 0.05$

	0	1/2	total
High den.	33 (30.5)	7 (9.5)	40
Low den.	28 (30.5)	12 (9.5)	40
total	61	19	80

Table 13. Deductive/inductive paragraph organisation

High ability readers, simple level text:

Deductive mean score 1.65
 Inductive mean score 1.7
 Chi Squared = 2.505, $p > 0.05$

	0	1/2	total
Deductive	6 (3.5)	34 (36.5)	40
Inductive	1 (3.5)	39 (36.5)	40
total	7	73	80

Low ability readers, simple level text:

Deductive mean score 0.65
 Inductive mean score 0.45
 Chi Squared = 0.474, $p > 0.05$

	0	1/2	total
Deductive	23 (24.5)	17 (15.5)	40
Inductive	26 (24.5)	14 (15.5)	40
total	49	31	80

High ability readers, normal level text:

Deductive mean score 1.925
 Inductive mean score 1.3
 Chi Squared = 16.05, $p < 0.01$

	0/1	2	total
Deductive	3 (11)	37 (29)	40
Inductive	19 (11)	21 (29)	40
total	22	58	80

Low ability readers, normal level text:

Deductive mean score 0.925
 Inductive mean score 0.4
 Chi Squared = 14.532, $p < 0.01$

	0/1	2	total
Deductive	10 (18.5)	30 (21.5)	40
Inductive	27 (18.5)	13 (21.5)	40
total	37	43	80

Table 14. Causal chain characteristics
 (N=80)

		Simple text (/5)		Normal text (/5)	
		hi ab	lo ab	hi ab	lo ab
On chain	Mean	4.525	2.625	4.525	2.75
	SD	0.64	1.55	0.82	1.61
Off Chain	Mean	4.5	2.675	4.375	2.575
	SD	0.82	1.73	0.81	1.48
Statistical sig.		0.8759	0.8144	0.2427	0.5505

Table 15. Explicit/implicit use of signal words

High ability readers, simple level text:

Explicit mean score 1.65
 Implicit mean score 1.5
 Chi Squared = 1.352, $p > 0.05$

	0/1	2	total
Explicit	12 (14.5)	28 (25.5)	40
Implicit	17 (14.5)	23 (25.5)	40
total	29	51	80

Low ability readers, simple level text:

Explicit mean score 0.975
 Implicit mean score 0.475
 Chi Squared = 7.273, $p < 0.01$

	0	1/2	total
Explicit	12 (18)	28 (22)	40
Implicit	24 (18)	16 (22)	40
total	36	44	80

High ability readers, normal level text:

Explicit mean score 1.225
 Implicit mean score 1.45
 Chi Squared = 1.875, $p > 0.05$

	0/1	2	total
Explicit	27 (24)	13 (16)	40
Implicit	21 (24)	19 (16)	40
total	48	32	80

Low ability readers, normal level text:

Explicit mean score 0.825
 Implicit mean score 0.475
 Chi Squared = 10.025, $p < 0.01$

	0/1	2	total
Explicit	10 (17)	30 (23)	40
Implicit	24 (17)	16 (23)	40
total	34	46	80

Table 16. Effect of initial gist summary

High ability readers, simple level text:

Gist mean score 1.875
 No gist mean score 1.65
 Chi Squared = 0.779, $p > 0.05$

	0/1	2	total
Gist	5 (7)	35 (33)	40
No gist	9 (7)	31 (33)	40
total	14	66	80

Low ability readers, simple level text:

Gist mean score 0.75
 No gist mean score 0.975
 Chi Squared = 3.387, $p > 0.05$

	0	1	2	total
Gist	19 (18)	12 (9.5)	9 (12.5)	40
No gist	17 (18)	7 (9.5)	16 (12.5)	40
total	36	19	25	80

High ability readers, normal level text:

Gist mean score 1.1
 No gist mean score 0.3
 Chi Squared = 33.884, $p < 0.01$

	0	1/2	total
Gist	8 (21)	32 (19)	40
No gist	34 (21)	6 (19)	40
total	42	38	80

Low ability readers, normal level text:

Gist mean score 0.25
 No gist mean score 0
 Chi Squared = 9.257, $p < 0.01$

	0	1/2	total
Gist	30 (35)	10 (5)	40
No gist	40 (35)	0 (5)	40
total	70	10	80